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3M-May, 1934
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ONTARIO

Ontario Department of Education

Courses of Study and Examinations

of the

HIGH SCHOOLS, COLLEGIATE INSTITUTES AND
CONTINUATION SCHOOLS

REVISED
1934

Issued by Authority of
THE MINISTER OF EDUCATION

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NOTICE

A comparison of this issue of the High School Courses of Study with the issue as revised and sent to the schools in 1933 shows the following changes:—

1. Subsection (5) of section 8, page 11, is new.
2. Subsection (2) of section 15, page 85, sets forth in detail without change in substance the content of the same subsection as it appeared in the revised edition of 1933.
3. Note 2 under clause (2) of section 16, page 85, is new.
4. The Note under clause (3) of section 16, page 86, is new.

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HIGH SCHOOL COURSES OF STUDY

Unless otherwise specified, the term "High School" shall be understood to include Collegiate Institute, High School and Continuation School.

Scope of the Course

The High School course of study, detailed below, is designed to be a continuous and progressive course of five years. It comprehends a Lower School course of two years, followed by a Middle School course of two years, and an Upper School course of at least one year. From the syllabus prescribed may be planned suitable courses for the needs of those pupils who desire to be admitted to the Normal Schools or to the Universities, or of those who wish to prepare for a business career, or of those who, not have such courses in view, desire to secure a general education.

SUBJECTS OF STUDY

Lower School Subjects

(A Two Year's Course)

1. (1) The following subjects are obligatory on all pupils in the Lower School except those in the Commercial Course:*

English (Literature, Composition).

British History and Physiography (each for one year, but not concurrently).

Algebra and Geometry (each for approximately one year, but not concurrently).

Physical Education.

(2) The following subjects are optional:

Arithmetic.

Grammar.

Art.

Geography.

Botany.

Zoology.

Agriculture and Horticulture, First Course.

Agriculture and Horticulture, Second Course.

Latin.

French.

Greek.

German.

Spanish or Italian.

Manual Training.

*The Requirements of the Commercial Course are defined on page 44.

Household Science.

Music.

Business Practice.

Additional subjects recommended by the local authorities and approved by the Minister.

Note.—1. Each of the following subjects in the above is a one-year course, viz., British History, Physiography, Algebra, Geometry, Arithmetic, Grammar, Art, Geography, Botany, Zoology, Agriculture and Horticulture (First Course), Agriculture and Horticulture (Second Course).

2. In schools in which Botany and Zoology are taught, these subjects should not both be taught the same year. The same applies to the First and the Second Course in Agriculture and Horticulture.

Middle School Subjects

(A Two Year's Course)

2. (1) The following subjects are obligatory on each pupil in each year of the Middle School:

English (Literature, Composition).

Physical Education.

(2) The following subjects are optional:

(a) Algebra.

Geometry.

Physics.

Chemistry.

Agriculture and Horticulture, I.

Agriculture and Horticulture, II.

Canadian History.

Ancient History.

(b) Latin.

Greek.

French.

German.

Spanish.

Italian.

(c) Manual Training.

Household Science.

Art.

Music.

Bookkeeping and Penmanship.

Stenography and Typewriting.

Additional subjects recommended by the local authorities and approved by the Minister.

Note.—With the exception of the foreign languages, each of the Middle School subjects provides a one-year course.

Upper School Subjects

3. (1) The following subject is obligatory on each pupil in the Upper School:
Physical Education.

(2) The following subjects are optional:

English (Literature, Composition).
Algebra.
Geometry.
Trigonometry.
Modern World History.
Physics.
Chemistry.
Botany.
Zoology.
Latin.
Greek.
French.
German.
Spanish.
Italian.

Additional subjects recommended by the local authorities and approved
by the Minister.

Limitations

4. (1) None of the Upper School courses may be taken up in a High School with a staff of only two regular teachers.

(2) Except with the approval of the Minister, obtained beforehand, none of the Upper School courses may be taken up in any Continuation School, or in a High School with a staff of only three teachers. As the Minister's approval applies only to the school year for which it is granted, it must be obtained every year.

(3) (a) The courses in Manual Training, Household Science, and Agriculture and Horticulture may be taken up in any school when provision therefor has been made satisfactory to the Minister on the joint report of the High School Inspector and the special Inspector or Director concerned.

(b) Due notice of the proposed establishment of any of the courses mentioned in (3) (a) above shall be sent to the Minister. Unless such notice is sent and the courses are approved by the Minister, their establishment is not authorized.

Instruction to be Provided

5. (1) It shall be the duty of the Board of every High School to provide instruction in the obligatory subjects of study, and in such of the optional subjects as they may select on the recommendation of the Principal.

(2) It shall be lawful for School Boards to establish and maintain part-time High School courses of instruction for the education of adolescents who are required to take such courses by the provisions of the Adolescent School Attendance Act.

(3) On the recommendation of the Principal, a Board may direct that one or more subjects of the upper School course be taken up in the second year of the Middle School course.

Selection of Subjects

6. (1) In each of the two years of the Lower School course, every pupil shall take, in addition to the obligatory subjects, not fewer than two or more than five of the optional subjects.

(2) In each of the two years of the Middle School course, every pupil shall take, in addition to the obligatory subjects, not fewer than four or more than seven of the optional subjects.

(3) A pupil who passes the examination in English in the first year of the Middle School shall in the second year take the English either of the Middle School course or of the Upper School course, as the Principal may direct.

(4) A pupil in the Upper School may take such subjects of the Upper School course as may be approved by the Principal.

(5) No pupil shall be exempted from the course in Physical Education except upon a medical certificate, or on account of evident physical disability.

(6) On application in writing by a parent or guardian the Principal with the approval of the Minister may in a special case allow a modification in the selection of the Lower School subjects.

7. In determining the maximum number of subjects to be taken by any pupil.

(1) Manual Training, Household Science, and Music shall not be counted.

(2) Each of the foreign languages of the Middle School course shall count as two subjects where the two-year course is being covered in one year.

(3) Where Middle School pupils in the second year of the Middle School course take one or more Upper School subjects, each subject so taken shall count as a Middle School subject.

RELIGIOUS EXERCISES AND INSTRUCTION

8. (1) (a) Every High School shall be opened with the reading of the Scriptures and the repeating of the Lord's Prayer, and shall be closed with the Lord's Prayer or the prayers authorized by the Department of Education; but no pupil shall be required to take part in any religious exercises objected to by his parent or guardian.

(b) (i) In schools without suitable waiting-rooms, or other similar accommodation, if the parent or guardian demands the withdrawal of a pupil while the religious exercises are being held, such demand shall be complied with, and the reading of the Scriptures shall be deferred in inclement weather until the closing.

(ii) To secure the observance of this Regulation, the teacher, before commencing a religious exercise, shall allow the necessary interval to lapse, during which the children or wards of those, if any, who have signified their objection may retire.

(c) If the parent or guardian objects to his child or ward taking part in the religious exercises, but directs that he shall remain in the school room during such exercises, the teacher shall permit him to do so, provided that he maintains decorous behaviour during the exercises.

(d) If, in virtue of his right to be absent from the religious exercises, any pupil does not enter the school room till the close of the time allowed for religious exercises, such an absence shall not be treated as an offence against the rules of the school.

(e) When a teacher claims to have conscientious scruples in regard to opening or closing school as herein prescribed, he shall notify the Board to that effect in writing; and it shall then be the duty of the Board to make such provision as it may deem expedient for the carrying out of the requirements of (1) (a) above.

(2) (a) The Scriptures shall be read daily and systematically; the parts to be read may be taken from the book of selections adopted by the Department for that purpose, or from the Bible, or from the list of the Selected Scripture Readings of the International Bible Reading Association, as the Board by resolution may direct.

(b) A Board may also order the reading of such parts by both pupils and teachers at the closing of the school, the repeating of the Ten Commandments at least once a week, and the memorization of passages selected by the Principal from the Bible.

(c) If the Board does not pass the resolution provided for in (a) above, the Principal shall make the selection himself, and shall promptly notify the Board of his action. Such action may be revised by the Board at any time thereafter.

(3) (a) A clergyman of any denomination shall have the right, and it shall be lawful for the Board to allow him to give religious instruction to the pupils of his own church, in each school house, at least once a week, after the hour of closing the school in the afternoon.

(b) Under the same conditions, a clergyman, selected by the clergymen of any number of denominations, shall also have the right to give religious instructions to the pupils belonging to such denominations.

(c) If the clergymen of more than one denomination apply to give religious instruction in the same school house, where the number of class-rooms is insufficient for all at the same time, the Board shall decide on what day of the week a room shall be at the disposal of the clergyman of each denomination, at the time above stated.

(4) Emblems of a denominational character shall not be exhibited in a High School during regular school hours.

(5) The Inspector shall each year bring to the attention of the Boards of Trustees the foregoing regulations relating to religious exercises and religious and moral instruction.

SUBJECTS TO ALL THE FORMS

Manners and Morals

9. (1) Throughout the courses the teacher shall incidentally, from current events, from the lessons in literature, history, etc., by his selection of the supplementary reading, and by his own example as well as by precept, give instruction in moral principles and practices and in good manners.

Oral Reading

(2) While Oral Reading is not prescribed as a separate subject of study, it is intended that it should be taken up systematically in connection with the study

of English Literature. To as great an extent as possible, the teacher of Literature should put on the pupil the responsibility for the oral interpretation of the passages studied in the class. The teacher should, when he finds it necessary, read portions of the lesson for the sake of example, but he should always remember that the pupil can never acquire the power to communicate to others the meaning of the printed page unless he has been trained to do so by much practice in class.

Writing and Spelling

(3) By the time he enters the High School, the pupil shall be able to write legibly and neatly, and to spell correctly the words in common use. But it should be the duty of the teachers to see that he does not lose this power, as he will inevitably do if not subject to constant oversight; and that he masters the spelling of the new words that he meets in his High School course.

If the Principal finds that the writing or the spelling is unsatisfactory, he should arrange that special attention be given to the subject. This may be done by assigning lesson periods or part of lesson periods or parts of lesson periods to the subject, or, in spelling, by compiling and drilling on words commonly misspelled by the pupils, and by familiarizing them with well-known rules for spelling.

In this connection it should be borne in mind that the practice of requiring pupils to write voluminous notes is a fruitful cause of careless writing and spelling.

Supplementary Reading

(4) In all the Forms, and in every year of the course, Supplementary Reading shall be taken in connection with the English Literature. At the beginning of each school year a list should be made out for each Form of such suitable works as may be obtained in the school, public or other library, and each pupil should be required to read during the year at least four books, of which two shall be non-fiction. In the Middle and Upper School, one of the four books must be poetry or the drama.

It should not be forgotten that the main purpose of the course in supplementary reading is to lead boys and girls to find pleasure and recreation in good literature. The posted lists, therefore, especially in the Lower School, should contain books which will appeal to those who have not yet formed the habit of reading, and books which will gratify those who have already formed the habit. Non-readers may be greatly helped in forming this habit by judicious advice from the teacher. A distaste for reading may easily be created by unsuitable selections and unwise requirements as proof that the reading has been done.

Physical Education

(5) (a) The main object of the course is the symmetrical development of the body, securing at the same time health, strength and grace, with correct and prompt obedience to the will.

(b) A systematic and well-developed course of exercise in Gymnastics, both free and, when practicable, with apparatus, should be taken up in each of the subdivisions. While dependent to some extent upon the accommodations and equipment, the exercises should always be suitable in character and frequency to the age and physical condition of individual pupils. Prevailing defects should be studied and exercises and directions given to correct them.

(c) The course in Physical Education is obligatory in all High Schools, except that apparatus work may be omitted in those which have no gymnasium. It shall be taken up systematically throughout the year for an hour and a half every week in each Form of the Lower School, and an hour every week in each of the Middle and Upper Schools.

While certain exercises should be repeated each year, the course should be planned as a progressive one and made attractive from year to year by exercises that appeal to the pupils' interest through their variety and their increasing difficulty. For this reason it is inadvisable to bring junior and senior pupils together in the same classes.

(d) In all Forms boys and girls should be trained separately by male and female teachers respectively. It is essential that the classes should not be too large.

(e) In High Schools with two teachers and in Continuation Schools the organization of the classes shall be subject to the report of the Inspector.

(f) The Principal may substitute, each week, for not more than half the time prescribed above, suitable games, in which all the members of a class shall take part, and which shall be under the supervision of one or more of the members of the staff.

(g) Where a Cadet Corps is maintained the courses therefor shall be given in accordance with the Regulations of the Department of National Defence, Ottawa. See Departmental Circular, Instruction No. 10. But where a Cadet Corps is maintained, the pupil may, on the written request of his parent or guardian, be exempted from the course prescribed for Cadet Corps.

(h) The following are the topics and the sub-topics of the course.

PHYSICAL EDUCATION

Boys and Girls

Health and Hygiene:

A series of discussions, during each year, on health-promoting habits. In particular, the following topics should receive attention: posture, exercise, air, food, effects of alcohol and narcotics.

Games, indoor and outdoor:

1. Group games, such as pass ball, relays, etc.
2. Team games, such as basketball, volleyball, softball, etc.

Swimming:

1. Land drill.
2. Practice in water of suitable strokes, etc.
3. Life-saving; breaks, towing holds.

First Aid:

1. First Aid relief: fractures, sprains, etc., wounds, hemorrhages, burns and scalds, poisoning.
2. Artificial respiration in case of asphyxia or drowning; prone-pressure method.
3. Practice in bandaging and carrying.

Boys

Marching:

Military and with variations.

Gymnastics:

1. Free exercises.
2. With apparatus:

Mats: rolls, handstands, etc.

Wall bats: exercises.

Parallel Bars: rests, sets, walks, vaults, spreads.

Horizontal Bar: grasps, rests, circles, underswings.

Rings: hangs, etc.

Horse: vaults, feints, circles.

Beam: exercises for arms, legs and trunk. Balance exercises.

Girls

Marching:

Variations and tactics.

Gymnastics:

1. Free exercises.
2. With apparatus:

Mats: rolls, etc.

Wall bars: exercises.

Horse: vaults, feints, etc.

Balance Form and Balance Beam.

Dancing:

1. Basic steps.
2. Rythmical balance exercises.
3. Folk dances.

Apparatus

(For Boys)

OBLIGATORY.—Mats—thickness, 2 inches—two, four feet by ten feet; two, four feet by four feet; box horse; boom; incline board or jump board; basketball; softball and bats; volley ball.

Note: Adjustable parallel bars and horizontal ladder may be substituted for the boom, and the vaulting horse for the box horse.

OPTIONAL.—Horizontal bar; flying rings; wall bars; vaulting standard and vaulting pole; climbing rope; medicine ball; practice baskets for basketball at sides of gymnasium; striking bag; gymnasium scale.

(For Girls)

OBLIGATORY.—Wall bars; box horse; balance forms; combination boom and balance beam; basketball; volley ball; softball and bats.

Note: The vaulting horse may be substituted for the box horse.

OPTIONAL.—Horizontal ladder; flying rings.

Books of Reference**Gymnastics:**

A Text-book of Gymnastics—Knudsen.

Fundamental Gymnastics—Niels Bukh.

Calisthenics—Staley.

Tumbling, Pyramid Building and Stunts—Cotteral.

Exercises on the Apparatus, Tumbling and Stunts—Wittich and Reuter.

Games and Athletics:

Games, Contests and Relays—Staley.

Games for the Playground, Home, School and Gymnasium—Bancroft.

Dancing:

Dances of the People—Elizabeth Burchenal.

Swimming:

Swimming Simplified—Sheffield.

Theory of Physical Education:

How to Live—Fisher and Fiske.

The New Physical Education—Wood and Cassidy.

DETAILS OF THE SUBJECTS OF STUDY**Lower School Subjects****ENGLISH GRAMMAR**

A formal course for one year, covering the general principles of syntax and etymology, together with a simple account of the development of the language. Aside from this formal course, Grammar should be taken as a part of Composition.

ENGLISH COMPOSITION

The dictionary: how to use the dictionary and its appendices; where to find the key sounds; drill on the key sounds; exercises.

Oral and Written Composition.

Letter writing.

Oral and written reproductions or abstracts.

Class debates.

Punctuation: uses of the marks of punctuation; exercises at frequent intervals until punctuation becomes an established habit.

Systematic and careful application of the principles of good English to the correction of mistakes made by the pupils in speaking and writing.

Good composition in all written work and clear and comprehensive answers in all oral work should be demanded by every teacher.

Notes.—1. In the First Form the structure of the English sentence should be emphasized, and this should be preceded by a rapid review of the parts of speech and practice in the grammatical analysis of sentences. In the Second Form the emphasis should be placed on the study of the paragraph and on practice in the writing of paragraphs.

2. The spelling and the writing of the compositions and other written exercises should be constantly supervised.

3. It cannot be too strongly urged upon the teacher that the dictation of notes or translations in any of the subjects taught is highly detrimental to the development of the pupil's power to think and to give expression to his thoughts.

ENGLISH LITERATURE

Intelligent comprehension and oral reading by the pupils of suitable authors, both prose and poetry.

Systematic reading by pupils of the texts studied in class. The selection of the books to be read in class rests with the Principal, who should be guided in his selection by the advice of the teacher of English. The texts chosen should be chiefly narrative, descriptive, and dramatic, with a few suitable short poems. In the selection of texts care should be taken not to choose those which the pupils will, later in their course, study for examination. The following plays of Shakespeare lend themselves to such a treatment as is desirable in the Lower School classes: *The Merchant of Venice*, *Twelfth Night*, *A Midsummer Night's Dream*, *As You Like It*, *Julius Cæsar*.

Memorization and recitation of choice selections in prose and poetry. Here much can be done to encourage a taste for literature by insisting that the memorized selections, when tested orally, be recited in such a way as to bring out their spirit and their melody.

Supplementary Reading provided by the pupils themselves or supplied from the school, public, or other library.

It should be recognized that the object of this course is to instil a love of reading and to cultivate a taste for good literature. To this end, standard authors should be selected, whose works will quicken the imagination and present a strong element of interest. Sufficient time should be allotted to the subject to permit of all or nearly all of the work being done in the class-room. To exact written homework in literature or to make the subject an examination burden is to defeat the object.

BRITISH HISTORY

British History to 1920. An outline study of the whole period, with greater emphasis on the period after the accession of Elizabeth.

The course in British History will include also the geography relating to the history prescribed.

ARITHMETIC

Review of principles; quantities and measures; the uses of commercial and business forms; applications of factoring (H.C.F., L.C.M., powers, roots); square root; fractions, including decimals; the metric system; percentage, commercial discount, profit and loss, commission, insurance, taxes, customs and excise, simple interest, promissory notes, partial payments on notes, bank discount, partnership, compound interest, use of interest tables, present value, mortgages, stocks and bonds, brokerage, exchange.

Mensuration: the rectangle, parallelogram, triangle, circle, cylinder, cone, sphere, rectangular solid, prism, pyramid; special units of measurement.

Oral arithmetic; new topics introduced orally; special and frequent practice to secure accuracy and rapidity; short methods.

Notes.—(1) it is suggested that arithmetic be taken in the second year of the High School course. (2) The processes and problems in the commercial work should be such as find direct application in ordinary life. (3) The common business forms are as follows: order, counter-checks, invoices, bills of goods, accounts, receipts, promissory notes, cheques, deposit slips, forms of endorsement.

ALGEBRA

Elementary work; factoring; H.C.F. and L.C.M.; easy fractions; simple equations of one, two and three unknowns; solution of easy problems.

Note.—The course covered should include at least the following portions of the Ontario High School Algebra: Chapters I to X, with articles 80 to 100 of Chapter XI, and articles 106, 107, 108, 109, 110 and 113 of Chapter XII. and Chapter XIV.

GEOMETRY

The study of formal Geometry should be preceded by a course in Practical Geometry, taken without a text-book, and extending over not more than two months. As the practical course proceeds, definitions should be developed and simple elementary geometric relations discovered, such as are found in vertically opposite angles, in the sides and angles of a triangle, in the angles made by a transversal and parallel lines, and in the congruency of triangles.

Throughout the course continuous practice should be given in the use of graded rule, compasses, protractor and set square in the accurate construction of figures and in the measurement of lines and angles.

Practical Geometry

The following outline of topics is suggested: Line, circle, triangle, construction of triangle having given three sides, classification of triangles according to sides, bisection of straight lines, angles, classification of angles, construction of triangles continued, classification of triangles according to angles, dissection of angles, perpendicular to a line from a point within and from a point without, construction of special angles, e.g., 60° , 30° , 45° , $22\frac{1}{2}^\circ$, etc., mariner's compass, drawing an angle equal to a given angle, parallel lines and figures, classification of quadrilaterals, dividing a straight line into equal parts, concurrent lines about a triangle.

Books of Reference

The following books will be found useful to the teacher:

Lessons in Experimental and Practical Geometry—Hall and Stevens.—Macmillan Co., Toronto.

Stage A Geometry—R. W. M. Gibbs.—A. & C. Black Ltd., 4, 5, and 6 Soho Square, London, W. 1.

A Junior Geometry—Siddens and Hughes.—MacMillan Co., Toronto.

Practical Geometry for Beginners—Foster and Dodds—Macmillan Co., Toronto.

Instructors' Syllabus in Geometry—Central Technical School Press, Toronto.

Formal Geometry

A course embracing a selection of the leading propositions in Elementary Geometry with simple exercises thereon.

The following are the topics of this course:

Each of the angles formed by two intersecting straight lines is equal to the vertically opposite angle.

If two triangles have two sides and the contained angle of one respectively equal to two sides and the contained angle of the other, the two triangles are congruent.

The angles at the base of an isosceles triangle are equal to each other.

If two triangles have the three sides of one respectively equal to the three sides of the other, the two triangles are congruent.

Bisect a given angle.

Draw a perpendicular to a given straight line from a given point in the line.

Bisect a given straight line.

Draw a perpendicular to a given straight line from a given point without the line.

Construct a triangle with sides of given length.

Construct an angle equal to a given angle.

If a side of a triangle is produced, the exterior angle so formed is greater than either of the interior angles not adjacent to it.

If a transversal meeting two straight lines makes the alternate angles equal to each other, the two straight lines are parallel. With converse.

If a transversal meeting two straight lines makes (1) an exterior angle equal to the interior and opposite angle on the same side of the transversal, or (2) the two interior angles on the same side of the transversal supplementary, in either case the two straight lines are parallel. With converse.

Through a given point draw a straight line parallel to a given straight line.

If one side of a triangle be produced, the exterior angle so formed, equals the sum of the two interior angles not adjacent to it.

The sum of the three interior angles of a triangle equals two right angles.

If one side of a triangle be greater than another side, the angle opposite the greater side is greater than the angle opposite the less side. With converse.

If two angles of a triangle are equal to each other, the sides opposite these equal angles are equal to each other.

If two triangles have two angles and a side of one respectively equal to two angles and the corresponding side of the other, the triangles are congruent.

If two triangles have two sides of one respectively equal to two sides of the

other and have the angles opposite one pair of equal sides equal to each other, the angles opposite the other pair of equal sides are either equal or supplementary.

Any two sides of a triangle are together greater than the third side.

If two triangles have two sides of one respectively equal to two sides of the other but the contained angle in one greater than the contained angle in the other, the base of the triangle which has the greater angle is greater than the base of the other. With converse.

Straight lines which join the ends of two equal and parallel straight lines towards the same parts are themselves equal and parallel.

In any parallelogram: (1) the opposite sides are equal; (2) the opposite angles are equal; (3) the diagonal bisects the area; (4) the diagonals bisect each other.

*The sum of the interior angles of a polygon of n sides is $(2n-4)$ right angles.

*If the sides of a polygon are produced in order, the sum of the exterior angles thus formed is four right angles.

*Divide a straight line into any number of equal parts.

*The locus of a point which is equidistant from two given points is the right bisector of the straight line joining the two given points.

*The locus of a point which is equidistant from two given intersecting straight lines is the pair of straight lines which bisect the angles between the two given straight lines.

The area of a parallelogram is equal to that of a rectangle on the same base and of the same altitude.

Parallelograms on the same base and between the same parallels are equal in area.

Parallelograms on equal bases and between the same parallels are equal in area.

The area of a triangle is half that of the rectangle on the same base and of the same altitude as the triangle.

If two triangles are on the same base and between the same parallels, the triangles are equal in area.

If two triangles are on equal bases and between the same parallels, the triangles are equal in area.

If a parallelogram and a triangle are on the same base and between the same parallels, the parallelogram is double the triangle.

The square described on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides.

ART

Aim of the Course

The teacher of Art should realize the aim of the Course in Art, which can be expressed briefly as follows:

- (a) To train the students to draw freely and expressively as an aid in the development of observation and inventiveness.
- (b) To give them practice in the use of various mediums of expression.
- (c) To develop the art of design in relation to nature and life; to cultivate the perception of beauty and of orderly composition in natural forms and the ability to apply such knowledge to beautifying common things of daily use.

*These topics may be deferred until the work of the Lower School is being reviewed in the Middle School.

- (d) To teach the meaning of colour as a stimulus to the æsthetic sense and its wide and significant use.
- (e) To correlate the course with other departments; to observe and respond to the particular needs of schools in communities where special industrial art trades are established; to aid in the formation of loan exhibitions of prints, drawings, paintings, craft work; to use the Art Galleries, Museums, Craft Shops of the cities and towns and to add to the experience and appreciative powers of the student.
- (f) Finally, to send the students out of the schools æsthetically alive to their surroundings; to aid those with special talent to specialize in the direction of their talent; and thus aid in the development of an Art-loving public.

The aim of the Course in Art can be expressed from the writings of John Ruskin, and may be adopted as a general aim and ideal for the course in Drawing:

“Learn Drawing—that you may set down clearly, and usefully, records of such things as cannot be described in words, either to assist your memory of them, or to convey distinct ideas of them to other people; to obtain quicker perceptions of the beauty of the natural world and to preserve something like a true image of beautiful things that pass away; . . . to understand the minds of great painters and to appreciate their work sincerely.”

Course of Study

The course is planned for five 40-minute periods, or their equivalent, per week for one year. As far as possible, double periods should be provided, so that the work of each lesson may be completed in the time allotted to it. If this is not possible, a period of instruction in Art should be followed by a “study” period so that the pupils may complete the work they have begun.

The following are the details of the course:

I. FREEHAND DRAWING.

- (1) In outline, (2) in tones expressive of light and shade, and of colour values, (3) in colour.

Studies shall be selected from each of the following groups:

- (a) Plant forms, such as grasses, fruits, vegetables, flowers, seed pods.
- (b) Animal forms, such as butterflies, shells, the best-known Canadian birds.
- (c) Curvilinear and rectilinear objects of simple form, such as pails, pottery, boxes, books, singly and in small groups.

Careful attention shall be given to the following:

- (a) The size and the position of the drawing on the sheet.
- (b) The expression of lines of growth in natural forms.
- (c) Proportion.
- (d) The principles of foreshortening and convergence.
- (e) Pencil and brush technique.

Exercises in direct brushwork shall precede painting in colour.

Exercises shall be given in memory drawing, on paper or blackboard, of objects previously drawn or observed.

II. DESIGN.

The basic principles of design shall be followed:

- (a) In the adaptation of previously drawn natural forms to the designing of decorative units, borders, and surface patterns.
- (b) In the filling of spaces, such as the circle, the lunette, the rectangle and the triangle.
- (c) In the making, with and without mechanical aid, of simple line letters, of plain block or Gothic letters, of modern Roman capitals and numerals, and in their arrangement in dates, titles and sentences; also in the designing of initial letters and monograms.
- (d) In illustration in line, in values and in colour; also in poster making.

Small stencils and blocks may be cut and used for the transfer of single units of design to objects of use and adornment.

Designs shall be worked out in black and white, in balanced neutral tones, and in colour schemes.

Colour, including its properties and simpler harmonies, shall be studied in connection with drawing, design and composition.

III. APPRECIATION.

The composition and other artistic qualities of pictures shall be studied:

- (a) To develop in the student an appreciation of the best in Art.
- (b) To improve the quality of his own work in drawing and in design.

It is recommended that the student be encouraged to collect and mount in a blank drawing book reproductions of good examples of paintings, of buildings, of sculpture, of decorative designs, of lettering, and of advertising drawings. This work should be related to the problems worked out in class.

As will be readily seen, a certain freedom in the working out of this course is allowed for the following reasons:

- (a) To develop the initiative and the resourcefulness of the teacher.
- (b) To permit changes of studies in drawing and design from year to year as the teacher becomes more efficient by experience.
- (c) To provide for variety among the various schools of the Province by allowing teachers to give attention to local interests, flora, etc., in the studies which they devise for their classes.

While it should be remembered that quality rather than quantity should determine the amount of work to be accomplished during the year, the following list of pieces of work is suggested as a reasonable amount to be done by each pupil:

- | | | |
|----------------------------------|-------------------------|-----------------|
| 1. Freehand Drawing: | Minimum number required | |
| (a) In outline | 6 | pieces |
| (b) In neutral value tones | 6 | " |
| (c) In colour | 10 | " |
| 2. Design and Lettering: | | |
| (a) In decorative design | 12 | " |
| (b) In lettering | 3 | " |
| (c) In stencilling | 2 | " (optional but |
| (d) In block-printing | 2 | " recommended) |
| 3. Appreciation: | | |
| (a) Picture Studies. | | |
| (b) Collection of Art clippings. | | |

Equipment for Teaching Art

The following equipment should be provided in every High School for the teaching of Art:

Models

Adequate provision of type objects, models of common objects, ceramics, and pictures is indispensable.

The following lists are given for guidance:

1. Type objects of wood and painted white.

One each of

Sphere, 12 inches diameter.

Cylinder, 8 x 12 inches.

Cone, 8 x 12 inches.

Six each of

Square Prism, 8 x 12 inches.

Square Pyramid, 8 x 12 inches.

Cube, 8 inches face.

Hexagonal Prism, 8 x 12 inches.

Circular Plinth, 8 x 12 inches.

Square Plinth, 8 x 12 inches.

2. One skeleton form of a cube 2 feet and a square pyramid, 2-foot base and 2 feet high.

3. Ceramics: Pots, kettles, drinking-glasses, pitchers, cups, vases, candlesticks, jardinières, etc.

Note.—The ceramics should be chosen not only for their individual beauty but for their form value in grouping and their colour value in a general scheme of colour harmony.

4. Unique objects, suitable for decorative purposes: Chinese lanterns and parasols, objects of Indian design, etc.

5. Plaster casts: Plaques, busts, figures, groups of figures, and historic ornament. Casts are optional in the Lower School, but are desirable for both decorative and instructional purposes.

Notes.—1. Carbon reproductions, etchings, and engravings of famous buildings, landscapes, and figures should also be provided to exemplify the laws of composition and to give the pupils some knowledge of the work of the great artists. These should be provided primarily as school decorations; they are not to be classed as Art Models.

2. For lists of suitable pictures, reproductions, and casts, see Educational Pamphlet No. 5: List of Reproductions of Works of Art.

3. In schools unable to purchase an adequate supply of the more expensive pictures, the cheap reproductions may be used to supplement. When, also, schools become acquainted with the masterpieces in this economical way, they will be better able to decide which of the more expensive reproductions to purchase.

4. Under the tariff, maps, photographic reproductions, casts, etchings, and lithographic prints or charts are specified as free, when specially imported in good faith by order of any College Academy, School or Seminary of learning in Canada, for use in instruction.

Working Equipment

1. Teacher's Easel and Drawing Board.
2. Drawing Boards for Pupils (three-ply, 13 inches by 17 inches).
3. Stands for models.
4. A water bottle for each pupil.
5. Lantern slides of Art subjects.

Reference Books

The following books will be found useful for Supplementary reading in Art and should be placed in every High School library:

A Guide to Pictures, by Charles H. Caffin. Doubleday, Page & Co., New York.

How to Enjoy Pictures, by M. S. Emery. The Prang Educational Co., New York.

Illustrated Exercises in Design, by E. G. Branch. The Prang Educational Co., New York.

Freehand Perspective and Sketching, by D. M. Norton. D. M. Norton, Pratt Institute, New York.

Pencil Sketching, by G. W. Koch. The Prang Educational Co., New York.

Art Education for High Schools. The Prang Educational Co., New York.

Apollo, The History of Art Throughout the Ages, by S. Reinach. Charles Scribner's Sons, New York.

The School Arts Magazine, edited by H. T. Bailey. The School Arts Publishing Co., Boston.

Applied Art (a very helpful and suggestive book), by Pedro J. Lemos. The Pacific Press Publishing Association, Mountain View, California.

Simple Art Craft for Schools, by Frederick Garnett. Methuen & Co., London.

Art Bulletins, numbers one to six, issued by the Department of Education.

Pictorial Education. Evans Bros., Ltd., Montague House, Russell Square, London, W. C., England.

Children's Artist Friends, by Mary L. McLennan. J. M. Dent & Sons.

Picture Appreciation for the High School, by E. V. K. Grayson, B.Sc. J. M. Dent & Sons.

GEOGRAPHY

In studying the industrial and commercial importance of the countries of the world, physical features, soil, climate, economic conditions and the national characteristics of the people are the factors which should be given special attention.

Maps should be used constantly, but the emphasis should be placed not on the political divisions of the continents, but on the regions of the world as determined by their physical and economic conditions, e.g., the wheat-growing belt of North America should be studied as a region, rather than as parts of the political divisions of the continent. In discussing the topics outlined below it should be borne in mind, however, that the pupils are interested primarily in Canada and the British Empire.

Products

Natural: relation of the natural products of a region to the physical features and climatic conditions.

Agricultural: cereals, vegetables, fruit, sugar, livestock, dairy products, tea, coffee, cocoa, tobacco, cotton, silk, rubber.

Forest: lumber, pulpwood, turpentine, maple sugar, furs (also fur farming).

Mines: building stone, road-making material, gold, silver, copper, nickel, iron, lead, aluminium, asbestos, coal, petroleum, natural gas, salt, sulphur.

Sea, Lake and River: inland and marine fisheries; the great fishing grounds of the world.

Water-power: relation to physical features and to industries. Hydro-electric development.

Manufactured: relation to natural products.

Steel and Iron: agricultural implements, structural steel, ships, locomotives, automobiles, cutlery.

Pulp and Paper.

Textiles: silk, cotton, linen, woollens, artificial silk.

Hides and leather.

Clay: porcelain, tile, brick.

Preserved meats, fruits, vegetables.

Coal by-products: gas, coke, dyes.

Centres of Commerce

Representative commercial centres of the world and the reason for their development, such as:

London	Hamburg	Melbourne	Bombay
Liverpool	Marseilles	Sydney	Chicago
Montreal	Rio de Janeiro	Cape Town	Cairo
New York	Buenos Aires	Yokohama	Paris
New Orleans	Toronto	Shanghai	Moscow
Vancouver	Winnipeg	Hong Kong	
San Francisco	Halifax	Singapore	

Transportation

Types of transportation.

Relation between trade routes, physical features and centres of commerce.

Inter-continental Trade Routes:

The great steamship routes.

The Panama Canal.

The Suez Canal.

Continental Railways:

The C. P. R.

The C. N. R.

The Cape to Cairo.

The Trans-Siberian.

Waterways:

St. Lawrence and Great Lakes.
 Mississippi.
 The Rhine, the Danube.
 The Nile.
 The Yang-tze-Kiang.

Motor highways: their commercial importance.

Map and Political Geography

The United Kingdom, Canada, Australia, Newfoundland, New Zealand, South Africa, India, The Irish Free State, the British West Indies, and other component parts of the British Empire.

PHYSIOGRAPHY

The course in Physiography is intended to be, as far as possible, an experimental and practical one carried on in the science laboratory, and in the field, by teachers who are skilled in laboratory practice.

The authorized text-book for the course is the Ontario High School Physical Geography. Topics or experiments outlined below not found in this text-book will be found, for the most part, in the Ontario High School Physics.

The order in which the topics appear in the syllabus is, in the main, the order in which they are discussed in the authorized text-book.

Note-books in Physiography should contain records of experiments, drawings of apparatus, observation and conclusions based on experiments and practical studies, but elaborate notes on other parts of the work are not called for as it should be borne in mind that one of the objects of the course is to teach pupils how to use a text-book. The dictation of notes is detrimental to the pupil's power to think and to give expression to his thoughts. Pupils should be carefully trained to compare their own written records.

The following are the details of the Course:

Physiography: Meaning of the term, how related to other subjects.

Measurements: Simple experiments involving measurements in metrical units of length, area, volume and mass; comparison of metrical and British units; the balance; practice in weighing; the three states of matter.

THE ATMOSPHERE:

Properties of air: experiments to show that air has weight and occupies space; that gases diffuse; that air exerts pressure; the relation between the volume and the pressure of a gas; the effect of changes in temperature on the volume of a gas; the thermometer; Fahrenheit and Centigrade scales; the barometer and common pump.

Constituents of air: combustion in air; rusting of iron in air; preparation of oxygen; combustion in oxygen; rusting of iron in oxygen; preparation of nitrogen and carbon dioxide; experiments to show the presence of these gases and water vapour in air.

The moisture in the air: experiments to illustrate evaporation, and the formation of fog and dew; clouds and hoar frost.

Weather: experiments on the transmission of heat by conduction, convection and radiation. Winds, storms, climate, reading of weather maps.

The sky: simple experiments on reflection, refraction and dispersion of light with reference to such atmospheric phenomena as colour of the sky, halos and rainbows.

WATER:

Simple experiments to show that water seeks its own level; transmission of pressure in water (Pascal's Principle); the buoyancy of water and of brine, the law of buoyancy (Archimedes' Principle); the specific gravity of solids such as (a) quartz or granite (b) iron or copper; the removal of suspended matter by settling and filtration, the effect of adding a little brine to water in which clay particles are suspended; the removal of dissolved solids by distillation; water as a solvent of solids and of gases, the effect of a solution of carbon dioxide in water on limestone; the freezing and the boiling points of water, the lowering of the melting point of ice by pressure; the expansion of solids by heat, the expansion of water on freezing; the high specific heat of water as compared with that of a solid such as sand; the low freezing point of brine as compared with that of water.

A detailed study of rivers, lakes, underground waters and springs.

The ocean: sea-floor, waves, currents, tides, sea-ice (icebergs and floe-ice).

LAND:

The examination of hand specimens of granite, trap, sandstone, limestone, conglomerate, shale, marble, gneiss, slate.

How rocks are formed.

Classification of rocks.

The weathering and erosion of rocks: the action of frost, changes in temperature, winds, the constituents of the air, plants and animals, running water, waves and moving ice (glaciers).

Rock movements: Volcanoes and earthquakes.

Land forms: mountains, plateaus, plains, islands.

THE EARTH AS A MEMBER OF THE SOLAR SYSTEM:

Simple experiments to show that light travels in straight lines and to show shadows (umbra, penumbra).

Movements of the sun, earth and moon.

Eclipses of the sun and moon; day and night; the seasons; the moon's phases; latitude and longitude; standard time and solar time.

Laboratory Equipment

It is recommended that there should be provided for each group of two (or three) pupils a set of apparatus consisting of the following:

- 1 Metre Stick.
- 1 Pinch Cock.
- 1 Measuring Cylinder, 100 C.C. graduated.
- 1 Wooden Cylinder, 8 x 5 cm., for volume measurement.
- 3 Beakers, different sizes.
- 1 Physical Balance with set of Metric Weights.
- 1 Bunsen Burner or Spirit Lamp.
- 2 Thistle Tubes.
- 1 Overflow Can, capacity about 450 C.C.
- 1 Catch Bucket, capacity about 175 C.C.
- 1 Specific Gravity Bottle.
- 1 Demonstration Hydrometer.
- 1 Filter Funnel.
- 1 Retort Stand, with two rings.
- 2 Florence Flasks, with perforated rubber stoppers to fit.
- 1 Hydrometer Jar.

- 1 Chemical Thermometer, graduated in C. degrees from—20 degrees to 110 degrees.
- 1 Glass Siphon.
- 2 Plain Mirrors, 10 cm. x 2 cm.
- 1 Equilateral Prism.
- 1 Refraction Plate, 2 x 6 x 10 cm.
- 1 Protractor.
- 1 Student's set of rock specimens specified in the Course of Study.
- 1 Test Tube Rack.
- 1½ Dozen Pyrex test tubes, 7 x 7/8 inch, with corks to fit.
- 1 Dozen Test Tubes, 5 inches x 3/4 inch.
- 1 Pound Glass Tubing (soft), 3/16 inch.
- 1 Yard Rubber Tubing 3/16 inch inside measurement.
- 1 Copper Gauze, 4 x 4 inches.
- 1 Asbestos Gauze, 4 x 4 inches.

In addition to the apparatus specified above, the Physiography Laboratory should contain the following pieces of apparatus for class demonstration:

- 1 Set of Rocks and Minerals. A very suitable set can be obtained from the Geological Survey, Ottawa, at a cost of \$6.00.
 - 1 Air Pump with bell jar. The Geryk type can be recommended.
 - 1 Set Metric Weights and Measures.
 - 1 Dissected litre block.
 - 1 Water Motor.
 - 1 Rotator or Whirling Table.
 - 1 Centrifugal Force Apparatus.
 - 1 Maximum and Minimum Thermometer.
 - 1 Differential Thermometer.
 - 1 Mercury Barometer.
 - 1 Aneroid Barometer or a Barograph.
 - 1 Optical Disc with accessories.
 - 1 Maximum Density of Water Apparatus.
 - 1 Davey's Safety Lamp.
 - 1 Pin-hole Camera.
 - 1 Bucket and Cylinder (Archimedes' Principle).
 - 2 Barometer tubes, heavy glass.
 - 1 Ball and Ring for demonstrating expansion of solids.
 - 1 Brass Tube with lever for demonstration linear expansion.
 - 1 Conductometer (simple form).
 - 1 Convection apparatus (air).
 - 1 Lift Pump, a common kitchen pump or a glass model.
 - 1 Triangular file.
 - 4 Packages of filter paper, circles 6 inches.
 - 1 Square foot of sheet rubber.
 - 1 Weight of air Globe.
 - 1 Simple apparatus for demonstrating Boyle's Law.
 - 1 Leslie's cube.
 - 2 Chemical thermometers graduated in F. from 0° to 220°.
 - 1 Calorimeter.
- Charts or slides to illustrate eclipses, moon's phases, etc.

BOTANY

The course in Botany as outlined below is based on the authorized text-book, Botany for High Schools. This book is intended to be used not only as a text-book, but also as a book of reference, as it contains matter for general reading which is beyond the limits of the course.

The course in Botany is to be essentially practical and experimental, and it is expected that the pupils will use note-books for drawings and for records of experiments and observations.

The teacher's immediate responsibility lies in the laboratory work, but this should be supplemented by out-door work which will of necessity vary with the locality. The teacher should encourage and direct the pupils, devoting a fair portion of the time of the class to discussions and reports on their independent work. Arrangements should be made for field excursions on suitable occasions.

The division of the course into three seasonal groups is intended merely as a suggestion to the teacher and not as a fixed arrangement.

Fall Term

The Plant as a Whole: a study of common plants such as buttercup, phlox, petunia, mallow, mustard, sweet pea, snapdragon, ground ivy (or catnip). At least four plants should be studied in detail taking up the structures of all the parts in succession; the study of additional plants to illustrate the various forms of roots, the structure, arrangement, and form of foliage leaves, the relation of leaves to sunlight, the varieties of stems such as underground, erect, prostrate, and climbing; the common types of inflorescence.

Study of typical composites, e.g., dandelion *or* chicory; daisy *or* cosmos; burdock *or* thistle.

Plant Identification: the identification by the use of a botany key of a few common plants. As the study of botanical terms is only incidental to the study of plants, pupils should begin plant identification as early as possible and in this way they will be introduced to technical terms in connection with the living plants and only as needed.

Fruits: meaning of the term; structure and classification of fruits; adaptation of plants for the dispersal of seeds and fruits.

Fungi: recognition and mode of life of the following saprophytes: mushroom, puff-ball, polypore; recognition, economic importance and control of the following parasitic fungi: grain-rust (*Puccinia graminis*), loose smut of oats (or corn smut), apple scab and black knot.

Preparation for Winter: storage of reserve food in root, stem, leaf, and seed; study of winter buds, their arrangement, structure and means of protection; the fall of the leaf; interpretation of leaf and scale scars on trees and shrubs.

Winter Term

Seeds and Seed Germination: the study of germinating seeds of bean *or* squash, corn *or* wheat, acorn *or* horse chestnut, pine *or* spruce, observing the markings and parts of these seeds, and the changes in the parts during germination; the functions of the parts of the seed; the most suitable conditions for the germination of seeds.

Plant Structures: structure of the stems of herbaceous dicotyledons and monocotyledons studied by the aid of a hand lens; study of a stomate and a plant cell from a thin preparation of the surface of such leaf as tradescantia (Wandering Jew), lily *or* geranium, under the lower power of a compound microscope; observation of lenticels, study of a young root showing root hairs and mode of branching.

Experiments: simple experiments illustrating osmosis, the application of this force in explaining the absorption by plant roots; simple experiments illustrating capillarity, the application of this force in explaining movements of water in soil; experiments to show the presence of soluble and insoluble materials in soils; experiments to illustrate leaf functions, e.g., transpiration, manufacture of starch in sunlight, disappearance of starch in darkness, exhalation of a gas by green plants; simple experiment to illustrate stem functions, e.g., conduction of cell-sap, heliotropism, wilting of plants, rootings of cuttings of house plants, testing for starch in tubers, seeds, etc.; simple experiments to illustrate region of growth of young roots.

Ferns: general structure and habits of a common fern.

Wood Sections: study of cross sections of a common tree, such as an elm or a cherry, noting pith, annual rings, heart-wood, sap-wood, cambium, bark, medullary rays.

Supplementary Studies: the discussion of such problems as the following: Relation of plants to their environment; weeds, methods of producing new varieties of plants; competition in plant colonies, uses of plants for food, clothing, building, medicine, paper, etc.

Spring Term

Forestration and Orchard Practice: how to plant a tree, principles of tree pruning; propagation of trees by seeds, budding, grafting, cutting, and coppice growth; importance of reforestation.

Plant Identification: identification of plants continued. Sufficient practice should be given in the use of the key to enable the pupils to identify the common flowering plants of the locality.

Spring Plants: methods of pollination, relation of flower structure to mode of pollination; spines, prickles, tendrils, underground parts, their forms and uses.

ZOOLOGY

The general scope of the work in Zoology is as follows:

Indoor Study of Living Animals: the teacher's immediate responsibility lies in the laboratory work which embodies simple morphological studies of common forms, representing the chief animal types. The studies must, wherever possible, be supplemented or preceded by observation of living specimens. For this purpose, provision will be needed for suitable aquaria and vivaria, where the moving, breathing, and feeding of the living animals may be within ready view of the pupils. Life histories of insects should be studied by collection of larvæ and observation of the stages of their development. *These morphological studies are not to end in the study of form, but accompanying the observation of the form there must be a constant effort to interpret the meaning of the form, to show the relation of form and function.*

Outdoor Work, which will of necessity vary with the locality, must be carried on to a very large extent without the teacher's direct supervision. But the teacher should encourage and direct the pupils, devoting a fair portion of the time of the class to discussions and reports on their independent work. Arrangements should be made for field excursions on suitable occasions.

School Museum: for progress in the natural history side of the subject, the equipment detailed below should be provided. The school museum should be a thing of gradual growth, and great care should be taken in the selection of the material.

Supplementary Reading: for general reading and discussion the following additional topics are suggested: the humane treatment of domestic animals; the conservation of wild animal life; destructive mammals; relation between plants and insects; interdependence of the plant and animal kingdoms; farming of fur-bearing animals.

The following are the details of the Course:

The course in Zoology as outlined below is based on the authorized text-book, *Zoology for High Schools*.

Arthropods:

Insects: (a) Study of the main external features and of the life-history of a grasshopper.

(b) Comparison of a grasshopper with a spider as to main external features.

(c) Description, life-history, relation to man, and methods of combating six harmful insects: Colorado potato beetle, codling moth, cabbage butterfly, tent caterpillar, mosquito, house fly.

(d) Description, life-history and relation to man of the following beneficial insects: Honey bee, dragon fly, silk worm.

(e) Recognition-characters of the principal orders of insects.

Crustaceans: Crayfish, external features with special reference to the organs and modes of breathing, walking, swimming and securing food.

Earthworms: external features, food, habits, economic importance.

Molluscs:

Clams: the composition and internal and external markings of the shell, gills, foot and siphons, observation of live specimens.

Slugs or Snails: external features, observation of live specimens.

Fishes: external features, gills and mode of breathing, feeding habits. Economic importance of fish, chief food fish of Canada, fish-hatcheries, protection of fish.

Amphibians: frogs; life-history, external features, economic importance of toads and frogs.

Reptiles: chief external features of turtles and snakes. Discussion of the habits and economic importance of snakes.

Birds: external features; study of feathers; adaptations for flight, including those of the skeleton; importance of birds; protection of birds; migration of birds; recognition of twenty common birds, including some winter birds (i.e., how to know them when they are seen); comparison of the bills and feet of different types of the birds of Ontario as related to their life habits.

Mammals: external features of cat *or* rabbit; skeleton of cat *or* rabbit; teeth of the following mammals as related to their life habits (a general idea of position and form): cat, rabbit, bat, horse, cow; feet of the following mammals in relation to their life habits: cat, dog, bat, mole, beaver (or muskrat). horse; uses of mammals to man from pupil's experience and reading (food, clothing, work, etc.); recognition of ten common wild mammals of Ontario and discussion of their habits.

Laboratory Equipment for Botany and Zoology

For practical work in Lower School Botany and Zoology each student should be provided with the following:

- 1 Pocket Magnifier.
- 2 Dissecting Needles.
- 1 Pair Dissecting Forceps.
- 1 Dissecting Scalpel or sharp Pocket Knife.

The apparatus for conducting experiments in physiology is described in the authorized text-books.

For Upper School Biology compound microscopes are essential; also dissecting sets and plans.

The following provisions apply to both the Upper and the Lower School Biology:

Aquaria

Aquaria of almost any desired form and price may be had from the dealers in school apparatus. Constant attention is necessary to ensure balanced conditions in the aquarium, and the instructor should take pains to inform himself on the points requisite for good management.

Skeletons

While special study of the skeleton is prescribed only in the case of the mammal, it is nevertheless desirable to have at hand the skeletons of other vertebrate forms included in the course. A very satisfactory collection, including the cat, perch, frog, snake, turtle, and crow, is supplied by the dealers.

Mounted foot bones of various types, such as pig, horse, sheep, rabbit, dog, and mole, are very useful.

Preparations Preserved in Fluids

Preparations illustrating the different stages in the development of the frog, the snake, and the fish are extremely useful. The smaller schools should be provided with at least the first named.

Admirable preparations of dissected specimens of the fish, frog, crayfish, fresh-water mussel, earthworm, and other types can be obtained from the dealers. The museums in the larger schools at any rate should have examples of these preparations.

Bird Skins and Mounted Birds

A collection of birds is indispensable in all the schools. There should be specimens of at least twenty representative birds of the locality, selected to show, among other things, the different types of feet and bills. Both mounted specimens and bird skins will be found useful for class study.

Mammals

The museum in every school should contain stuffed specimens of a few representative wild mammals of the locality.

Insects

A standard collection of insects and mounted specimens showing the life history of insects, representative of the different orders, should be provided in every school. Such a collection can easily be accumulated by the pupils themselves under the teacher's direction, and special care should be taken to guard it against injury. A fair value will be allowed for deserving collections made in this way.

Cabinets

For the proper preservation of skeletons, mounted birds, insects, and other dry museum specimens, dust-proof cabinets are essential. These should be constructed partly as glass-fronted cases with shelves, and partly with well-fitted drawers.

Museum Jars

As already suggested, specimens illustrating the general fauna of the locality should be collected, carefully preserved, and added to the museum. To accommodate the collections preserved in fluid, suitable jars are a necessity. These can be had from the dealers in considerable variety. Those commonly known as "gem jars," in pint and quart sizes, will answer most purposes; but jars with flat sides exhibit the contents to better advantage. Such jars, however, are more expensive.

Botanical Material

For botanical work it is highly desirable that the pupils themselves should be encouraged to collect the material needed. A suitable cabinet with drawers is necessary for the herbarium, which should have a place in every school museum. The specimens kept in the herbarium should be carefully selected and mounted, and the whole should form a standard for the guidance of the pupils in this branch of their work.

Standard collections of woods should also be kept on view, and it serves a good purpose to have mounted on large sheets specimens illustrating special points such as provision for seed dispersal, varieties of stem forms, etc.

A collection of woods showing the depredations of destructive insects would be very instructive.

AGRICULTURE AND HORTICULTURE

Regulations

1. (1) Schools intending to introduce the work in Agriculture and Horticulture at the commencement of the school year and thus qualify for the regular grants, shall make written application to the Deputy Minister before September 15th, for permission to undertake the work. This notice shall be signed by the Chairman of the Board as well as by the Principal.

(2) (a) The work shall not be undertaken unless there are at least six pupils in regular attendance in the class of each year.

Note.—While only six pupils are required in order to commence the work, it is very desirable that as many as possible of the pupils of the classes concerned should take it up. Principals and Boards of Trustees are urged to use their influence to this end, particularly in the case of pupils who might profitably take up the work.

(b) The instruction shall be given by a teacher who holds a Specialist's certificate, or an Intermediate certificate in Agriculture.

(3) It is not necessary that the pupil should carry on the practical work at his own home. In some cases he may arrange to undertake some line of work in a neighbour's field or garden, for which he may accept payment; or he may carry out the work in one of the experimental plots at the school; neither is it necessary that the pupils should perform all the work alone.

(4) The work to be undertaken by the pupils as home projects should be considered and selected early in the course so that there may be sufficient time for reading up on the subject and maturing plans. In assisting a pupil to select a project, his age and home interests should all be considered. The aim should be to choose some project which can in all probability be carried through successfully. The pupils in each class should be restricted to a limited number of undertakings, and groups of pupils should work at some common projects. The work may be carried out through the organization of a *School Progress Club*, in which case the number of projects will be best limited to a very few. A number of projects have been outlined in the course of study, but only a few should be undertaken in one year by the pupils in a class. Some of the simpler projects or those requiring only a short period in which to carry them through, should be supplemented by others. Generally speaking, the project which involves careful attention through a period of some length should yield the largest educational returns.

(5) (a) Records of the instruction given in school and the practical work carried on in home projects or in school plots shall be kept systematically by the pupils. These records should be kept in some uniform system, preferably in a loose-leaf note book, and shall be available for inspection.

(b) The collections of economic plants, insects, and weed seeds, made in connection with the work, shall also be available for inspection.

(c) In projects that have a commercial side to them, the records should show the time spent on the work and the value of the products.

(6) For guidance in carrying out the course the teacher should apply to the Inspector of Agricultural Classes, Department of Education, Toronto, and for the circulars to the Deputy Minister of Education.

Course of Study

First Year Course

Botany: the study of common flowering plants such as buttercup, mallow, mustard, petunia, to illustrate the parts of a plant; root, stem, leaf, flower, flower cluster; field study of weeds; recognition of fifteen common weeds; habits of growth; methods of seed distribution and principles of weed eradication; study of typical composites, e.g., dandelion *or* chicory, sunflower *or* cosmos, burdock *or* thistle.

Plant identification: the identification of a few common plants by the use of a key, e.g., Wild Plants of Canada. As the study of botanical terms is only incidental to the study of plants, pupils should begin plant identification as early in the course as possible, and in this way they will be introduced to technical terms gradually and only in connection with living plants.

The Study of:

- (a) Roots—e.g., corn, glass, sweet clover, carrot.
- (b) Stems—e.g., sunflower, mallow, ivy, bindweed, couch grass, potato.
- (c) Leaves—e.g., corn, beet, bean, horse-chestnut, cabbage, clover.
- (d) Common types of inflorescence—e.g., mustard, plantain, carrot, clover, dandelion.
- (e) Common types of fleshy and dry fruits.

Experiments: simple experiments illustrating osmosis, the application of this force in explaining absorption by plant roots; simple experiments illustrating capillarity, the application of this force in explaining movements of water in soil; experiments to show the presence of soluble materials in soils; experiments to illustrate leaf-functions, e.g., transpiration, manufacture of starch in sunlight, disappearance of starch in darkness, exhalation of a gas by living green plants in sunlight. Simple experiments to illustrate stem functions, e.g., conduction of cell-sap, phototropism, wilting of plants, rooting of cuttings of house plants, testing for starch in tubers, seeds, etc.; simple experiments to illustrate region of growth of young roots.

Examination through a compound microscope of plant cells, stomates, root-hairs.

Seeds and Seed Germination: the study of germinating seeds of bean *or* squash, corn *or* wheat, observing the parts of these seeds and the changes in the parts during germination; discussion of the functions of the parts of the seed and simple experiments to determine the most suitable conditions for seed germination.

Gardening: work in home gardens arranged; plans for home gardens: preparation, care and uses of hot bed and cold frame; preparation of soil; methods of growing early vegetables such as potatoes, onions, rhubarb, lettuce, cabbage, tomatoes; methods of growing strawberries, currants; selection of varieties of plants; planting tables; care of growing plants; preparation and planning of experimental and demonstration plots in the school garden.

Entomology: external structure of grasshopper, butterfly and beetle; characteristics of insects; manner in which insects breathe; three types of mouth-parts in relation to feeding habits; rearing common insects from egg to adult or from larva to adult, with observations on their feeding habits, metamor-

phosis (complete or incomplete); rate of reproduction among insects; beneficial insects and the ways in which they are beneficial.

Dairying: testing whole milk with Babcock tester; use of lactometer; food value of milk, whey and buttermilk; examination of a sample of milk by means of a compound microscope.

Visit to a dairy farm, noting construction ventilation and lighting of dairy stables.

Poultry: types and common breeds; incubation, brooding and rearing of chicks; management of poultry; crate-fattening; visits to a poultry plant; models of poultry houses.

Bee-keeping: life history and work of bees; colony studies to learn organization; swarming; construction of hives and methods of handling; management of bees in fall and winter.

Home Projects: completion of one home project, which may be selected from such topics as:

1. Management of a colony of bees.
2. Making a collection of insects.
3. Making a collection of weeds.
4. Use of a Babcock test on a herd during the summer.
5. Management of home plot or garden.
6. Canning small fruits or vegetables.
7. Growing small fruits or vegetables.
8. Construction and care of a hot bed.
9. Incubating and raising a brood of chickens.
10. The production of mangel, turnip or cabbage seed.
11. The growing of two varieties of a vegetable for purposes of comparison.
12. Experiments to show the effects of the use of a commercial fertilizer.
13. Germination tests of seeds for vitality.
14. Crate-fattening of poultry.

Note.—The work of the home projects should be commenced during the first year of the High School course and may be completed in that year or in the second year. At least one project will have been completed before the end of the second year.

Second Year Course

Botany: study of a typical grass flower, wheat or rye.

Study of grasses with special reference to their economic importance; methods of collecting, mounting and labelling plants; study of ten noxious weeds of the locality, preferably ten of those mentioned in The Seeds Act; collection and recognition of ten samples of weed-seeds.

Plant Identification: identification of plants continued. Sufficient practice should be given in the use of the key to enable the pupils to identify the common flowering plants of the locality.

Fungi: recognition, life history and saprophytic habits of mushrooms, puff-ball, polypore; recognition, economic importance and control of the following parasitic fungi: grain rust (*Puccinia graminis*), loose smut of oats or corn smut, apple scab and black knot. Microscopic examination of

spores of rust or smut and mycelium of bread mould. Microscopic examination of yeast, and of starch grains from potato.

Bacteria:

What they are and where they occur.

Beneficial and injurious bacteria.

Relation to foods: experiments to show pasteurization and sterilization of milk and of canned foods.

Water pollutions; purification of water by boiling; use of chloride of lime as a disinfecting agent.

Infectious diseases, e.g., tuberculosis, typhoid fever, diphtheria; discussion of the agents of infection, such as house flies, drinking cups, etc.

Fruit Growing: grafting and budding of fruit trees; propagation of currants or gooseberries by cuttings; orchard practice: drainage, planting, pruning, cultivation, fertilizing and spraying; law relating to the grading of apples; fruit packages and methods of packing.

Gardening: selection and outdoor planting of bulbs; methods of potting and of forcing bulbs for winter bloom.

Chemistry: elements, compounds, mixtures and solutions.

Experiments to show: chemical changes; the composition of water and of air; the characteristic properties of acids, bases and salts. Simple experiments to prove that plants contain moisture, carbon and ash. Identification of two of the products of combustion of each of the following: wood, paper, alcohol, coal oil, and of two products of respiration. Tests for starch and protein. The properties and uses of baking powder and of yeast.

Soil: collection by the students of sand, clay, loam and muck; a comparison of these soils with respect to colour, weight, size of particles, stickiness when wet, conditions upon drying, "feel," capacity for holding water, rapidity of percolation of water through soil, degree of capillary action; importance to soil humus and the bacteria found in the nodules on the roots of certain leguminous plants.

Entomology: study of injurious insects: losses from insects; natural control factors; value of fall ploughing and a short rotation of crops in the control of insect pests; insecticides for (a) biting insects, (b) piercing and sucking insects; life histories and methods of control of the house fly, mosquito, potato beetle, codling moth; recognition of the orders:—Orthoptera, Coleoptera, Neuroptera, Diptera, Lepidoptera, Hemiptera, and Hymenoptera; methods of collecting, preserving and mounting insects.

Birds: their relation to weeds and insects.

Poultry: care of eggs; candling eggs; egg preservatives; Canadian egg laws; culling of poultry for egg production.

Farm Animals: types and breeds of cows, draught horses, sheep and swine; visits to stock farms.

LATIN AND GREEK

Ontario High School Latin Book.

Ontario High School Latin Reader.

White's First Greek Book (Greek begun in the Second year).

The study of Latin grammar is intended to serve the pupil, not as an end in itself, but as a means by which he may become able to read Latin with understanding. His first concern is to learn certain inflections, to familiarize himself with the order of the Latin sentence and some simple rules of syntax, and to acquire a vocabulary; and from as early a stage as possible his growing knowledge should be applied to the reading of simple Latin stories, which will both test the reality of his progress and reward his labour.

The judicious teacher will neither prescribe as lessons nor yet wholly ignore the introductory pages of the authorized text-book; in particular, a knowledge of pronunciation and of the principles of accent is a necessary preparation for the oral reading which should be practised throughout the whole course and for the free use in the class room, by both teacher and pupil, of the spoken as well as the written Latin word. The teacher should also carefully read and consider the preface of the text-book, with a view to using it in the most profitable way.

Much time may be wasted in handling the exercises for translation. The sentences of Part I in each exercise should be orally translated by the pupils. To require the use of the blackboard in the translation of these Latin sentences is usually a waste of time that might be used to better advantage by practice in oral variations of words or phrases. The sentences of Part II of the exercises are quite sufficient in number and normally need not be supplemented. All the important points they illustrate will recur frequently in the succeeding exercises. Before assigning these sentences for seat work or for home work, the teacher should make sure that there has been sufficient explanation and illustration of any difficulties the pupil is likely to meet. With some classes and at some stages the teacher may find it advisable to try postponing Part II of a given exercise and taking it up again with Part I of a later exercise. Increased familiarity with some troublesome new form or usage as it recurs in succeeding Latin sentences may thus greatly lessen the pupil's difficulties, prevent discouragement, and enable him to make more rapid progress. Time, again, may be saved by remembering that the continuous Latin of Part III is, in both syntax and vocabulary, based on what has already been learned, and should be taken as sight work.

By the intelligent adoption of such methods and devices for making the best use of the available time, the teacher should be able to strike the right balance between the discouraging monotony of too frequent reviews in the interests of thoroughness and the superficiality and inaccuracy that may attend too rapid advance. *It seems reasonable to expect that with normal classes the first forty-one lessons of the Latin Book should be covered during the first year of the course; and that by pursuing the same aims and methods in the second year, the teacher should complete the work to the end of Lesson LXXV. In addition, it should be possible to include in the work of the second year Part I of the Ontario High School Latin Reader and perhaps also under favourable conditions, some of Part II. This reading should be done as far as possible as sight work in classes under the guidance of the teacher. Every effort*

should be made to promote a liking for the work in Authors and to this end written translations should be discouraged.

Note: In order to facilitate an early beginning in the work of the High School Reader, the ablative absolute might, with advantage, be taught along with the Past Participle Passive (Lesson LIII), and the common forms of the subjunctive might be introduced somewhat earlier in the second year than they would ordinarily come.

The same principles apply generally to the study of Greek, but progress should be much more rapid, and the knowledge of Latin will remove a large proportion of the difficulties presented by Greek.

FRENCH AND GERMAN SPANISH AND ITALIAN

Texts: the Grammars and Readers authorized for use in the schools.

During the first six weeks the work in French should be chiefly for the training of the ear and the tongue, and should be carried on without the use of a text-book. It will be necessary, therefore, to study the sounds of the language systematically, though not necessarily by means of phonetics, so that accurate pronunciation may be secured. Teachers, however, would do well to make a careful study of phonetics to ensure the accuracy of their own pronunciation.

At the beginning oral work should be emphasized. This course should be carefully graded, so that the pupil may constantly increase his knowledge of names of common objects, states and actions. Short stories, easy descriptions, occasional references to French life as well as to the geography of France will stimulate his interest in the study of the language. Exercises in dictation will assist him in word recognition and will help to develop an appreciation of the tone-quality of French. During this early period oral drill should be frequent, and simple points of grammar should be learned incidentally.

Throughout the course French should be used, as far as possible, as the medium of conversation and instruction. Occasionally, however, difficulties may arise when time will be saved by the use of English.

It should be remembered that the purpose of this course is to develop in the pupil the following abilities, arranged in the order of their importance:

(a) To read and comprehend modern French prose or poetry of reasonable difficulty; (b) to understand conversational French when spoken clearly and French prose and poetry when read carefully; (c) to pronounce correctly, to read with suitable expression, and to use French in a conversational way; (d) to write simple French, either as a translation of English into French, or in the form of free composition.

As early as possible in the course, it would be wise to begin some simple reading with the class. The French Reader authorized for use in the schools provides a number of well-graded selections for this purpose. In addition to this, however, the Board should supply other suitable books to supplement the reading provided in the authorized Reader.

The other modern languages should be begun in the same way. Readers in these languages are also authorized. Where it is desirable, German may be taught first. As a general principle, however, two modern languages should not be begun in the same year.

In the Lower School course not more than thirty-five lessons of the Ontario High School French Grammar and twenty-five lessons of the Ontario High School German Grammar should be covered. Part I and II of The French Reader are intended for Forms I and II respectively.

BUSINESS PRACTICE

The purpose of this course should not be to produce bookkeepers, but to give useful information regarding such business papers and procedure as the pupil may meet with in after life in conducting his own affairs. This purpose should be kept in mind by the teacher in working out the sets in bookkeeping. The emphasis should be placed on the business usages and forms rather than on the actual recording. It is suggested that blank forms of all business papers and documents should be secured by the teacher so as to make the topical discussions as practical as possible.

Penmanship

The writing of exercises designed to secure freedom of movement and correctness of form of the figures and of the letters of the alphabet, as outlined in Book III of the Ontario Writing Course.

The writing and ruling of ledger headings and accounts, and the following business forms: cheque, draft, invoice, and order, to be taken from the sets prescribed for bookkeeping.

Note.—At least 10 minutes of each lesson in Business Practice throughout the course should be devoted to penmanship.

Business Forms and Usages

A definite knowledge of the form and use of receipts, postal notes, express orders, post office orders, promissory notes, Dominion and bank bills, orders for money and goods, deposit slips, cheques, bank pass books, drafts, invoices, delivery slips, credit invoices, statements of account, monthly statements, endorsement, acceptance and consequent liability.

An explanation and discussion of leases, contracts, partnership agreements, agreements of sale, deeds, mortgages, lien and instalment notes, joint notes, joint and several notes, bills of lading, wills, and powers of attorney.

Printed forms of the foregoing should be secured by the teacher and examined by the students.

Bookkeeping

A one year's course to be selected from the authorized text in Bookkeeping.

All the business forms of each set should be written out and filed before, or at the same time, as the records of the transactions in the set are made. The records should include the general journal, cash book, ledger entries, closing of the ledger accounts, and the making of the necessary financial statements.

VOCAL MUSIC

First Year

Tune: drill in singing from the Tonic-Solfa, or Staff, Modulator, exercises containing the tones of the Major and Minor Scales, in all keys, with simple modulations.

Time: simple and compound Duple, Triple and Quadruple Measures, containing pulse divisions of halves, quarters, thirds and rests, in varied combination.

Sight-Singing: musical sentences in two and three parts, combining the elements of Tune and Time described above.

Songs: three-part songs containing a lower part adapted to the need of boys whose voices have changed.

Ear Training: writing or naming the notes of short musical phrases, based on the Major and Minor scales, when sung or played by the teacher.

Voice Training: exercises in breath control, vowel production and enunciation of consonants.

Musical Theory: the Treble and Bass clefs, names of lines and spaces, key and time signatures, intervals of the Major scale, and marks of expression.

Second Year

Tune: continuation of the studies in Tune prescribed for Form I, with the addition of the tones of the Chromatic Scale and more advanced modulations.

Time: continuation of the studies in Time prescribed for Form I, with the addition of analysis of Musical Form and Phrasing.

Sight-Singing: musical sentences in two, three and four parts, combining the elements of Tune and Time described above.

Songs: three and four-part songs and choruses, with lower parts for Tenor or Bass voices.

Ear Training: writing or naming the notes of short musical phrases containing simple chromatic progressions, when sung or played by the teacher.

Voice Training: extension of the studies prescribed for Form I.

Musical Theory: treble and Bass clefs, Key and time-signatures, diatonic and chromatic intervals, and the elements of Vocal Physiology.

Choirs or choral societies should be formed in co-operation with the School Literary Societies and should be trained at such times as may be arranged by the Principal. Lectures on musical subjects should also be given, illustrated by vocalists, pianists or victrolas.

MANUAL TRAINING

First Year

Drawing: simple plans and elevations. Correct use of drawing board, T-square, set squares and compasses. Construction of the common geometrical figures. Simple lettering and figuring. Working drawings of objects made, both full size and to scale.

Wood Work: growth, structure and identification of the woods used in the locality. Warping, twisting, checking; how caused and counteracted. Making of simple objects according to drawings previously prepared. Proper use of nails, screws, and glue. Use of simple joints in articles made; for example,

end half lap, centre half lap, mitre, housing. Use and mechanical construction of common wood-working tools as exemplified in the making of a series of objects useful in the home or in the farm and garden, such as bread board, bench hook, nail box, milking stool, flower trellis, chicken feed hopper, stationery holder, floor and table lamp, bird house, etc. Construction of simple school apparatus.

Household Mechanics: a short course in the solution of common household problems, such as repairing loose joints in furniture, glazing a sash, repairing a leaking tap, cleaning a drain trap, reading a gas, water or electric meter, tightening a spring blind roller, etc.

At least every alternate piece of work shall be kept for inspection.

Second Year

Drawing: elementary orthographic and isometric projection. Simple sections. More advanced geometrical drawing. Freehand dimensioned sketches. Inking, tracing, lettering, and blue printing. Working drawings of more advanced objects.

Wood Work: growth, structure and identification of the woods used in the manufactures of the locality. Tool sharpening. Common joints used in various kinds of wood work—scarfing, simple dovetail, mortice and tenon, tongue and grooved joint—their use in making objects such as boxes, drawers, tables, book-cases, waggon jacks, chicken brooders, step ladders, trap nests, tool boxes, saw horses, wheel-barrows, etc. Fastenings with dowels, pins, cleats, wedges, etc. Calculations from drawings and specifications of lumber required for articles made, and cost.

At least every alternate piece of work shall be kept for inspection.

Various methods of finishing, as staining, fuming, filling, shellacking, oiling, waxing.

Wood Turning: explanation of the lathe, its action, speed, parts, care and use. The gauge, correct position, turning rough cylinder. The skew chisel; reason for grinding both sides and at an angle. Concave surfaces with skew chisel. Irregular curves and spindle work. V grooves, beads and hollows. The introduction of hard wood and sand paper, exercises in turning handles. Face plate turning, chuck work, boxes with covers, powder box, napkin ring, goblet, etc.

Every piece of work shall be kept for inspection.

Household Mechanics: where a wood-turning equipment has not been installed or where it is not feasible to instal such an equipment, the first year course may be extended to include such problems as simple upholstery, concrete work, soldering, hanging a door, repairing a mortice lock, repairing a flushing tank, wiring a bell and lamp, rewiring an electric iron, making a window screen, reseating a cane bottom chair, sharpening and adjusting a lawn mower, etc.

Metal Work: simple ornamental work in brass, copper and iron. The making of simple objects such as watch fobs, paper knives, blotter corners, trays, bowls, etc.

Making hinges, escutcheon plates, straps, corners, etc., for use on the wood working models.

Making sugar scoops, cookie cutters, and other simple household utensils out of tin cans and other waste material.

Every piece of work shall be kept for inspection.

HOUSEHOLD SCIENCE

First Year

A brief review of the course of the Elementary School.

Cleaning: best methods of cleaning dishes, dish towels, sinks, wooden surfaces, steel, nickel, silver, aluminium.

Foods: general functions:

- (a) Source of energy. Food constituents yielding heat and energy: Carbohydrate, fat, protein.
- (b) Source of building material: Protein, mineral matter, water.
- (c) Source of regulating material: Cellulose, vegetable acids, water.
- (d) Other food essentials: Vitamins.

Food Requirements from a health standpoint.

Food elements in milk, eggs, fruit, vegetables, cereals, and the principles involved in their preservation and their place in the diet.

Cookery: the lighting and care of a gas, electric or coal stove.

Laboratory work should be arranged to emphasize the planning and serving of meals.

A practical study of the more elementary flour mixtures such as tea biscuits, muffins, plain cake, griddle cakes.

Planning and serving a simple breakfast and luncheon or supper which may include beverages, cereals, fruits, milk, eggs, salads, cream soups, creamed dishes.

Packing and planning of school and picnic lunches.

Note.—The subjects given below are intended to be taught simply (not technically). In schools where there is no laundry equipment the order of work may be developed in class and the practice carried out at home.

Home Nursing: two or three simple lessons to include the following:

- (a) The care of the sick room.
- (b) Care of patient's bed.
- (c) Simple invalid diet.
- (d) Making of mustard and other simple poultices.
- (e) Care and filling of the hot water bottle.

Laundry Work: necessary materials—water, alkalies, soap, blueing, starch, and the action of each.

Processes in the washing of white clothes, coloured clothes, woollens, silks.

Sewing: a review of the course of the Elementary School as far as the condition of the pupil's knowledge necessitates, using finer materials.

Cleaning, oiling, threading and running of sewing machine.

Household linen—choice of material, making towels, table linen, etc.

Underclothing—choice of materials, instruction in the use of patterns, the making of simple cotton garments.

General care of clothing—cleaning, pressing, removal of spots and stains, repairing, care when not in use.

Second Year

The House: it is intended that two or three lessons shall, in a very general way, cover the following points:

Site: soil, sun, exposure, environment.

Plan: material, number size and relative position of rooms.

Lighting: candles, coal-oil, gas, electricity, considered from standpoints of lighting-power, heat, vitiation of air, care and cost.

Heating: fire-places, stoves, hot-air, hot-water, and oil furnaces considered and compared.

Ventilating: sources of house-air impurities, purpose of ventilation, simple home methods.

Sanitation: principles involved in the sanitary care of the house and premises.

Furnishings: Material, form, colour, care required when in use.

General Housecleaning: care and arrangement of cupboards, clothes cupboards, bureau drawers, chests and trunks.

Cleaning of rooms in order—attic, bedrooms, bathroom, living-room, dining-room, halls and stairs, kitchen and cellar.

Special cleaning of walls, windows, floors, curtains, rugs and furnishings.

Foods: a review of the functions of food and of food principles and a study of the principles found in meats, fish, gelatine.

Planning a day's meals to meet various requirements.

Cookery: a review of the first year course and its extension to more advanced cookery.

Practice in cooking meats, fish, gelatine mixtures, desserts and frozen dishes.

A study of the more advanced flour mixtures and practice in cooking sponge cake, pastry, cookies, steam puddings, bread.

Planning and serving a simple family dinner.

Marketing: seasons for domestic and well-known imported foods; current prices of foods.

Note.—If possible, markets and shops should be visited and pupils given the responsibility of buying home and school supplies.

Entertaining: preparation of simple refreshments.

Planning and preparing for guests.

Duties of hostess and guests.

Note.—In school one or two lessons will be sufficient for this. Additional practice may be obtained in entertaining at home.

Household Accounts: systematic spending of the income; keeping account of household expenses.

Hygiene: health rules regarding sleep, cleanliness, food, clothing, fresh air and sunshine, work and play, regularity of habits, normal weight.

Body processes—respiration, circulation, digestion, excretion.

Sewing: a review of Form I work in regard to machines, patterns, stitch forms, selection and care of clothing.

Design: a study of line and colour as related to various types.

Textiles: source, manufacture, relative cost, durability, laundering qualities, widths.

Selection of materials and the making of cotton, linen or silk broadcloth simple dresses, middies, blouses or pyjamas.

Comparison of the finished product with ready-made garments as to style, quality, workmanship and cost.

Special emphasis should be laid on selection of clothing for the High School girl (outer apparel, under garments, shoes and accessories).

THE COMMERCIAL COURSE

As the Commercial Course for High Schools is intended to suit local needs, it is provided that the pupils be given a general High School education, together with a special training in the more purely commercial subjects, such as may be required. The Lower School Courses for these subjects are to be followed, except where specified herewith.

Obligatory Subjects

The following subjects are obligatory on all pupils taking the Commercial Course:

1. Physical Education (two years).
2. English: Literature, to include Oral Reading (two years); Composition, to include English Grammar (one year), Composition, to include Business Correspondence (one year).
3. Canadian History and Civics (one year), British History and Commercial Geography (each one-half year).
4. Arithmetic to include Rapid Calculation (two years).
5. Penmanship and Spelling (two years).
6. Bookkeeping to include Business Forms (one or two years).
7. Office Practice to include Business Law (one year).
8. Typewriting (one or two years).
9. Physiography (one year).

Optional Subjects

1. Shorthand (one or two years).
2. A Modern Language (two years).

Note.—Students who wish to specialize in Bookkeeping shall take it for two years and may omit Shorthand. Those who wish to specialize in Shorthand shall take it for two years and may omit the second year of Bookkeeping.

The following are the details of the course:—

Composition and Business Correspondence

In teaching this work every effort should be made to avoid the memorization and use of stereotyped so-called Business English.

(a) Oral Work:

Oral and written composition; elements of narration and description.

Letter writing.

Oral and written reproductions or abstracts.

Class debates.

Systematic and careful application of the principles of good English to the correction of mistakes made by the pupils in speaking and writing.

Good composition in all written work should be demanded by every teacher.

(b) Written Work:

Practice in writing:

- (a) Letters ordering goods.
- (b) Letters acknowledging receipt of goods.
- (c) Letters of application.
- (d) Letters accompanying remittances.
- (e) Letters of introduction.
- (f) Letters of recommendation.
- (g) Letters asking for remittance.
- (h) Sales letters.

The subject matter for these letters should be taken as far as possible from actual business, and their production should be correlated with the typewriting.

Notes.

(1) Actual practice in oral and written compositions should largely predominate. The main principles of composition (rhetoric) should be learned from the criticism of the compositions, and systematized as the work proceeds.

(2) For some weeks at a time the study of the English literature texts may be intermitted, and some of the time thus set free devoted to English Composition, in the teaching of which the supplementary reading might be utilized, and compositions might be written in the class under the supervision of the teacher.

(3) The spelling and the writing of the compositions and other written exercises should be constantly supervised. In the oral and written composition, subjects selected from commercial activities should occasionally be selected.

Books of Reference

Business Correspondence—Edward and Ferguson. Ryerson Press. 50 cents.

Exercises in Every-day English for Canadians—Caughlin. (Sir Isaac Pitman & Sons). 45 cents.

British History

The Lower School Course from 1688 to the present time, with special reference to the Industrial Revolution and subsequent development.

Canadian History and Civics

- I. Discovery and Exploration.
- II. Settlement and Colonization.
- III. Development in the Government of Canada.
- IV. External Relations of Canada.
- V. Canada Since Confederation.
- VI. The following Elements of Canadian Welfare:

- (1) Health.
- (2) Education.
- (3) Civic Beauty.
- (4) Transportation.
- (5) Municipal Government.

Note.—(1) Sections III and VI of this course are obligatory. In addition pupils must take either Sections I and II, or Sections IV and V.

(2) The course in Canadian History includes the geography of the history prescribed.

Books of Reference

The following books will be found useful for supplementary reading on the topics of the course:

Chronicles of Canada (32 Vols.). Glasgow, Brook & Co.

Makers of Canada (12 Vols.). Glasgow, Brook & Co.

(These two series deal with almost every phase of Canadian History. The first series is more suitable for younger pupils).

The Works of Francis Parkman (12 Vols.)—(The French Period). Little, Brown and Co.

Edgar—The Romance of Canadian History—(Excerpts from Parkman). The Macmillan Company, Ltd.

Roberts—History of Canada. The Macmillan Company, Ltd. \$1.50.

Laut—Pathfinders of the West. The Macmillan Company, Ltd. \$1.00.

Locke—When Canada Was New France. J. M. Dent and Sons, Ltd. 45 cents.

Wallace—By Star and Compass. Oxford University Press. 50 cents.

Everyman's Literary and Historical Atlas of America. J. M. Dent and Sons, Ltd. 55 cents.

Guest—A Social History of England—Revised for Ontario schools by Kendrick. Clarke, Irwin & Co. 55 cents.

Arithmetic

Elementary work reviewed.

Vulgar fractions, decimal fractions, practical measurements, square root, percentage, trade discount, profit and loss, commission, insurance, taxes, simple interest, duties and customs, bank discount, storage, marking goods, depreciation, cost-keeping, partnership, compound interest, use of interest tables, present worth, trade discount, domestic and foreign exchange, stocks.

Mensuration—the square, the triangle, the circle, rectangular and cylindrical solids.

Regular practice in rapid calculation—exercises to cover the four simple rules, extension of bills and invoices, percentage, interest and discount, exchange and commission.

Books of Reference

High School Arithmetic. 45 cents.

Canadian Standard Business Arithmetic—Brown. (The Commercial Text Book Co.) 35 cents.

Canadian Business Arithmetic, Part I—Keast. (Sir Isaac Pitman & Sons). 80 cents.

Penmanship

1. Movement exercises.
2. Capitals O, A, C, and E, single and combined.
3. Minimum small letters—i, u, w, v, x, o, a, c, e, r, s.
4. Figures.
5. Capitals, N, M, W, X, Q, Z, H, and K, with easy words.
6. Loop letters—l, h, b, k, j, g, y, z, q, and f, with words.
7. Remaining capitals with words.
8. Sentences comprising minimum letters.
9. Easy signatures.
10. Sentences.
11. Body or paragraph writing.
12. Ledger headings.

Spelling

Spelling, pronunciation, and syllabication of words in common use, of geographical names, of names of noted persons, of names of well known and of local business firms, and of commercial terms; meaning of words in common use. The review lists of the Public School Speller will be found helpful. Pupils should be given frequent opportunities to consult a standard dictionary.

Book of Reference

Words, their Spelling, Pronunciation, Definition, Application. Gregg Publishing Co. 33 cents net.

Bookkeeping

First Year

1. Business proprietorship as expressed in the fundamental equation—assets minus liabilities equals net capital; trading, gross trading profit, operating costs; net profit; statements to show profit and loss, assets and liabilities.
2. Business transactions, business papers; elementary banking practice.
3. Journalizing; asset and liability accounts, trading accounts, cost accounts; proprietor accounts; posting, trial balance, financial statements, closing the ledger.
4. Special journals—simple cash book, sales and purchase journal, bill journals.
5. Exercise and short sets to illustrate the principles taught.

Note.—A high standard of neatness and accuracy should be demanded from the first and all work should be done with pen and ink.

Second Year

1. Review of the First Year course.
2. Columnar cash journals, petty cash.
3. Interest and discount, cash discounts, bank charges, bad debts.
4. Partnership—adjusting interest and profits, goodwill.
5. Classified financial statements.
6. Division of the ledger; controlling accounts.
7. Single entry bookkeeping as an incomplete system; changing single entry to double entry.
8. Exercises and short sets to illustrate the principles taught. At least one complete set should be worked using the actual business papers, both incoming and outgoing.

Note.—The foregoing are to be studied in connection with the working out of the exercises and sets found in Modern Bookkeeping—Course I. (J. M. Dent & Sons. Ltd.; 60 cents). The course may be supplemented by the use of Ontario School Bookkeeping, Second Course. (W. J. Gage & Company, Ltd.; 90 cents).

Office Practice

Note.—In teaching this work the business forms should be used whenever possible.

1. Appearance, health and conduct of the office employee.
2. Care of inward and outward correspondence.
3. Filing.
4. Such office appliances as are in common use in the locality—adding machine, komptometer, duplicating machines, bookkeeping machines, etc.
5. Telephone, telegraph and postal facilities as aids to business.
6. Banking practice.
7. Customs—a general idea of the steps to be taken in passing goods through customs.
8. Business reference books and their use.
9. Express and railway services.
10. Shipping by boat.
11. Commercial agencies for credit information, etc.

Books of Reference

Office Routine. Commercial Text Book Co. 65 cents.

Office Practice. Edward & Gregory. The Ryerson Press. 50 cents.

Secretarial Studies—SoRelle & Roszell. Gregg Publishing Company. 40 cents net.

Bulletins of Office Equipment Companies.

Business Law

Sources of law; contracts—kinds, forms, parties, consideration, agreement, interpretation, discharge; negotiable paper—endorsement, acceptance, discharge, dishonour, protest, payments—how made, application of payments, legal tender; affidavits, receipts and releases; Statute of Frauds; Statute of Limitations—application to accounts, professional fees, rents, notes, mortgages, judgments, dower, easements; leases, deeds, mortgages, agreements of sale, lien and instalment notes, bills of lading, powers of attorney; partnership—kinds, formation, dissolution, and the duties, powers and liabilities of partners; wills.

Typewriting

The work in this subject should be correlated with the work in Business Correspondence, Stenography, Office Practice, and Bookkeeping.

- I—1. Touch method; mechanism and care of the machine.
2. Typing letters on letter, memorandum, and note-size paper, post cards.
3. Addressing post cards, envelopes, and wrappers.
4. Folding and inserting.
5. A speed of twenty words a minute.
- II—1. Typing letters from student's own shorthand notes, from printed shorthand, and from oral dictation.
2. Copying processes—carbon copy, letter-book, and letter-press; multiplying copies of circular letters by neostyle and mimeograph.

3. Centering—invitations, programmes, menus, title pages, index pages, reports, schedules.
4. Tabular work—account invoices, trial balances, financial statements, statistics, business forms, etc.
5. Copying from rough drafts with corrections.
6. A speed of forty words a minute.

Suggested Practice Books

Elementary Typewriting. Edward and Dickson. Ryerson Press. 40 cents.

Office Routine (a Canadian Business Practice for Stenographers). Commercial Text Book Co. 65 cents.

High School Typewriting, Course I—Roszell & Hewitt. Gregg Publishing Co. 35 cents.

High School Typewriting, Course II—Roszell & Hewitt. Gregg Publishing Co. 40 cents.

Shorthand

First Year

1. The application of the principles of the Isaac Pitman shorthand system to the writing of common words within the vocabulary of the first year pupil.

Note.—This should include 2,000 of the most commonly used words.

2. Ability to write, either from dictation or from printed shorthand, continuous material 40 to 60 words per minute.
3. Ability to read rapidly either printed shorthand or shorthand notes.
4. Transcription of shorthand notes into longhand.

Second Year

1. Review of the first year and extension of the shorthand principles to the 3,000 common words.
2. Writing sight material from dictation at a rate varying from 70 to 90 words per minute.
3. Reading of short stories in shorthand.
4. Transcription of shorthand notes on the typewriter. (Median rate of class. 25-30 words per minute).

Books of Reference

SHORTHAND:

New Standard Course in Pitman Shorthand—Revised (Sir Isaac Pitman & Sons. Canada, Ltd.; Commercial Text Book Co.) 90 cents.

Review and Dictation Course in Pitman Shorthand (Sir Isaac Pitman & Sons. Canada, Ltd.; Commercial Text Book Co.) One dollar.

SPECIAL ONE-YEAR COMMERCIAL COURSE

Students to be eligible for this Course must have completed successfully at least two years' High School work or its equivalent.

The subjects are as follows:

1. Physical Education.
2. English: Literature, to include Oral Reading; Composition, to include Business Correspondence.
3. Canadian History and Civics (for those who have not already taken the subject in the High School).
4. Oral Arithmetic and Rapid Calculation.
5. Penmanship and Spelling.
6. Bookkeeping, to include Business Forms.
7. Office Practice, to include Business Law.
8. Typewriting.
9. Shorthand.

MIDDLE SCHOOL SUBJECTS

ENGLISH COMPOSITION

The Course of the Lower School in oral and written composition continued and extended, with greater attention to the development of literary style.

The elements of Narration, Description, Exposition, and Argumentation.

The study of models of prose-writing and the memorization of two or three good models.

The planning of compositions and the writing of compositions from plans.

Notes:

(1) On returning a set of compositions to the writers, the teacher should discuss the merits and demerits of the pupils' work and give helpful criticism.

(2) Good composition in all written work and clear comprehensive answers in all oral work should be demanded by every teacher. The dictation of notes and the writing of translations should be avoided.

(3) The Debating and the Literary Society should supplement the work in this subject; but constant practice in writing is the basis of all progress in composition.

(4) The question paper in English Composition will consist of two Parts, A and B. Candidates will be required to write an essay on one of several themes given in each of the two parts of the paper, that is, each candidate will hand in two short essays instead of one long essay.

The themes given in Part A of the paper will be suitable for essays, narrative and descriptive in character. The themes given in Part B will be suitable for essays, expository and argumentative in character.

Each essay should be about a page and a half or about 250 words in length.

ENGLISH LITERATURE

Intelligent and appreciative study of suitable authors, both prose and poetry, including those prescribed for the Departmental and University Matriculation Examinations.

Systematic oral reading by the pupils of the texts studied in the class.

Supplementary reading provided by the pupils themselves or supplied from the school, public, or other library.

Memorization and recitation of choice selections in prose and poetry prescribed by the Department and of others made by the teacher.

Note.—At this stage the pupils begin to appreciate literature as such. Besides supplementary reading of the same character as that taken up in the Lower School, other works of a subjective character may be added. The purpose and the spirit of the author and the merits of his thoughts and style should now be dealt with in a general way; his defects should not be emphasized. The chief object is still the cultivation of a taste for good literature, and the authors should be read partly in class and partly at home both silently and aloud.

CANADIAN HISTORY

The history of Canada as outlined in the *History of the Canadian People*. This will include the chapter on the Government of Canada.

The course in the history of Canada will include also the geography relating to the history prescribed.

The following books of reference will be found useful:

Chronicles of Canada—Glasgow, Brook & Co.
 The Makers of Canada—MacLean Publishing Company.
 Works of Francis Parkman—Little, Brown & Company.
 History of Canada, Duncan McArthur—W. J. Gage & Company, Ltd.
 High School History of Canada, W. L. Grant—The Ryerson Press.
 The Story of Canada, G. M. Wrong, Chester Martin, Walter N. Sage—
 The Ryerson Press.

ANCIENT HISTORY

The history of Greece and of Rome as outlined in the *Ancient History* (Revised Edition), authorized by the Department of Education of Ontario. This will include chapters I-XXII inclusive on The Orient and Greece, and chapters I-XXIII inclusive on this History of Rome.

The course in Ancient History will include also the geography relating to the history prescribed.

Books of Reference

The following books will be found useful for supplementary reading on the topics of the course, and should be placed in every High School library:

Breasted, Ancient Times, Ginn & Co.
 Botsford, A History of Greece, The Macmillan Company, Ltd.
 Pelham, Outlines of Roman History, G. P. Putnam's Sons.
 Havell, Republican Rome, Ballantyne Press.
 Cotterill, Ancient Greece, Ballantyne Press.
 Botsford, A Source Book of Ancient History, The Macmillan Company, Ltd.
 Munro, A Source Book of Roman History, Heath & Co.
 Fling, A Source Book of Greek History, Heath & Co.
 Translations of the Histories of Herodotus, Thucydides, Polybius and Livy.
 Ginn's Classical Atlas, Ginn & Co.
 The Story of Greece and Rome, by J. C. and H. G. Robertson, The Macmillan Company, Ltd.
 Essentials in Ancient History—Wolfson—American Book Company.

ALGEBRA

Lower School course reviewed and extended; fractions and fractional equations; extraction of roots; simple graphs; simple ratio and proportion; indices, surds and surd equations; quadratics of one and two unknowns, with solutions of problems; theory of quadratics.

The course is covered in the Ontario High School Algebra. The following, however, may be omitted: Articles 228, 229, 230, 242, 243 and Chapter XXVI.

GEOMETRY

A selection of the leading propositions in Elementary Geometry, with exercises thereon.

The topics of the course are as follows:

Lower School course reviewed and extended.

If two equal triangles are on the same side of a common base, the straight line joining their vertices is parallel to the common base.

The complements of the parallelograms about the diagonal of any parallelogram are equal to each other.

Construct a parallelogram equal in area to a given triangle and having one of its angles equal to a given angle.

Construct a triangle equal in area to a given quadrilateral.

Construct a triangle equal in area to a given rectilineal figure.

Describe a parallelogram equal to a given rectilineal figure and having an angle equal to a given angle.

Construct a triangle equal in area to a given triangle and having one of its sides equal to a given straight line.

On a straight line of given length make a parallelogram equal in area to a given triangle and having an angle equal to a given angle.

The square on the sum of two straight lines equals the sum of the squares on the two straight lines increased by twice the rectangle contained by the straight lines.

The square on the difference of two straight lines equals the sum of the squares on the two straight lines diminished by twice the rectangle contained by the straight lines.

The difference of the squares on two straight lines equals the rectangle of which the length is the sum of the straight lines and the breadth is the difference of the straight lines.

The square described on the hypotenuse of a right-angled triangle is equal to the sum of the squares on the other two sides, with converse.

In an obtuse-angled triangle, the square on the side opposite the obtuse angle equals the sum of the squares on the sides that contain the obtuse angle increased by twice the rectangle contained by either of these sides and the projection of the other side on it.

In any triangle, the square on the side opposite an acute angle is equal to the sum of the squares on the sides which contain the acute angle diminished by twice the rectangle contained by either of these sides and the projection of the other side on it.

If from a point within a circle more than two equal straight lines are drawn to the circumference, that point is the centre.

Find the centre of a given circle.

Circumscribe a circle about a given triangle.

If two chords are equally distant from the centre of a circle, the chords are equal to each other.

If a chord of a circle does not pass through the centre, the chord is less than a diameter.

Of two chords in a circle the one which is nearer to the centre is greater than the one which is more remote from the centre, with converse.

The angle which an arc of a circle subtends at the centre is double the angle which it subtends at any point on the remaining part of the circumference.

If angles are in the same segment of a circle, the angles are equal to each other.

If the straight line joining two points subtends equal angles at two other points on the same side of it, the four points are concyclic.

The angle in a semi-circle is a right angle.

The angle in a major segment of a circle is acute.

The angle in a minor segment of a circle is obtuse.

If a quadrilateral be inscribed in a circle, its opposite angles are supplementary, with converse.

If two angles at the centre of a circle are equal to each other, they are subtended by equal arcs.

The radius drawn to the point of contact of a tangent is perpendicular to the tangent.

Draw a tangent to a given circle from a given point without the circle.

If at one end of a chord of a circle a tangent be drawn, each angle between the chord and the tangent is equal to the angle in the segment on the other side of the chord.

On a given straight line construct a segment containing an angle equal to a given angle.

From a given circle cut off a segment containing an angle equal to a given angle.

In a given circle inscribe a triangle similar to a given triangle.

Find the locus of the centres of circles touching two given intersecting straight lines.

Inscribe a circle in a given triangle.

Draw an escribed circle of a given triangle.

Describe a circle to touch three given straight lines.

About a given circle circumscribe a triangle similar to a given triangle.

Inscribe a circle in a given regular polygon.

If two circles touch each other, the straight line joining their centres passes through the point of contact.

If triangles have equal altitudes, their areas are to one another as the bases of the triangles.

A straight line drawn parallel to the base of a triangle cuts the sides, or the sides produced, proportionally, with converse.

Divide a given straight line into any number of equal parts.

Find a fourth proportional to three given straight lines taken in a given order.

Divide a given straight line in a given ratio.

Divide a given straight line similarly to a given divided line.

If the vertical angle of a triangle be bisected by a straight line which cuts the base, the segments of the base are proportional to the other sides of the triangle, with converse.

The bisector of the exterior vertical angle of a triangle divides the base externally into segments that are proportional to the sides of the triangle, with converse.

If the angles of one triangle are respectively equal to the angles of another, the corresponding sides of the triangles are proportional, with converse.

If two triangles have one angle of one equal to one angle of the other and the sides about these angles proportional, the triangles are similar, the equal angles being opposite corresponding sides.

If two triangles have two sides of one proportional to two sides of the other, and the angles opposite one pair of corresponding sides in the proportion equal, the angles opposite the other pair of corresponding sides in the proportion are either equal or supplementary.

The perpendicular from the right angle to the hypotenuse in a right-angled triangle divides the triangle into two triangles which are similar to each other and to the original triangle.

Find the mean proportional between two given straight lines.

If four straight lines are proportionals, the rectangle contained by the means is equal to the rectangle contained by the extremes.

If two rectangles are equal to each other, the length of one is to the length of the other as the breadth of the second is to the breadth of the first.

If two chords intersect within a circle, the rectangle contained by the segments of one is equal to the rectangle contained by the segments of the other, with converse.

If from a point without a circle a secant and a tangent are drawn, the square on the tangent is equal to the rectangle contained by the secant and the part of it without the circle, with converse.

The areas of similar triangles are proportional to the squares on corresponding sides.

To describe a polygon similar to a given polygon and with the corresponding sides in a given ratio.

Divide similar polygons into similar triangles.

The areas of similar polygons are proportional to the squares on corresponding sides.

If three straight lines are in continued proportion, the first is to the third as any polygon on the first is to the similar and similarly described polygon on the second.

Make a polygon similar to a given polygon and such that their areas are in a given ratio.

Make a figure equal to one given rectilineal figure and similar to another.

In equal circles, angles, whether at the centres or circumferences, are proportional to the arcs on which they stand.

PHYSICS

A course defined as follows with mathematical applications simple and direct in character.

Sound

VIBRATION AND WAVE MOTION:

Experiments to illustrate vibratory motion of the pendulum, strings and plates; transverse and longitudinal vibrations of a brass rod; wave motion in water, a rope and coil spring.

PRODUCTION, TRANSMISSION, REFLECTION AND VELOCITY OF SOUND:

Experiments to show that sound originates in a vibrating body (tuning forks, violin strings) and that sound travels in wood, water, air, etc., but not in a vacuum; to show consonance and reflection of sound (echoes).

Methods of determining the velocity of sound in air.

DISTINGUISHING FEATURES OF SOUND:

Experiments on intensity, pitch and quality.

Experiments on the law of lengths and the law of tensions of vibrating strings, and simple problems on these two laws; the four laws of vibrating strings.

Experiments on resonance by use of organ pipes (or other tubes) and resonance jars. Determination of pitch and velocity by means of resonance. Sympathetic vibrations.

Experiments with vibrating strings, plates and organ pipes to illustrate nodes and loops.

INTERFERENCE PHENOMENA:

Experiments on interference and the production of beats.

Heat**NATURE AND SOURCES OF HEAT:**

Experiments to show that energy of motion (kinetic energy), chemical energy, electrical energy, and radiant energy may be converted into heat.

The sun as a source of heat.

TEMPERATURE:

Experiments to show—the expansion and contraction of solids, liquids and gases due to changes in temperature; the different rates of expansion of (1) solids; (2) liquids; the temperature at which the density of water is at a maximum.

Construction and graduation of Centigrade and Fahrenheit thermometers.

Charles' law; absolute zero.

QUANTITY OF HEAT:

Quantity of heat as contrasted with temperature; heat unit (the calorie); specific heat.

Experiments to find the specific heat of a metal and of a liquid.

CHANGE OF STATE DUE TO HEAT:

Fusion. Experiments to determine the heat of fusion of ice.

Vaporization. Experiments to determine—the heat of vaporization of water, the effect of pressure on the boiling point of water, the rates of evaporation of water and of ether; cooling by evaporation; dew point.

TRANSFERENCE OF HEAT:

Experiments to show—conduction and convection of heat, the absorption and the emission of heat by different surfaces.

Light**NATURE AND SOURCES OF LIGHT:**

The transmission of light.

Experiments to show—that light travels in straight lines, the forming of an image through a pin hole, the forming of shadows; the methods of measuring the intensity of light by means of (1) the shadow, (2) the grease spot, (3) the diffusion photometer.

REFLECTION OF LIGHT:

Experiments to show,—the law of reflection, the formation and the position of images in plane and spherical mirrors.

Drawing images of objects in any position.

REFRACTION OF LIGHT:

Experiments to show refraction; to measure the index of refraction; to illustrate the first law of refraction; to show total reflection.

Relation between velocity of light and index of refraction.

Experiments: to show the converging and the diverging of light by means of lenses; to determine the focal length, conjugate foci, and the formation of images by lenses.

The drawing of images formed by lenses and the relation between the size of the image and the size of the object.

OPTICAL INSTRUMENTS:

Simple microscope, camera, and projection lantern.

COLOUR:

Experiments with prisms to show the decomposition of white light and the combining of coloured lights to form white light, and with Newton's disc to illustrate complementary colours.

Experiments to show the effect of the transmission, the reflection and the absorption of light in producing colours.

The rainbow.

Magnetism and Electricity

MAGNETISM:

Experiments to show—the laws of magnetic attraction and repulsion, magnetic lines of force, magnetic field, magnetism by induction, magnetization, magnetic permeability, terrestrial magnetism, inclination and declination of the magnetic needle, evidence that each particle of a magnetized body acts as a magnet.

STATIC ELECTRICITY:

Experiments to show,—electrical attraction and repulsion, the two kinds of electrification, conductors and non-conductors, electrification by contact and by induction, the residence of electric charges on the surfaces of conductors, the distribution of an electric charge on a surface, the escape of electric charges from points (lightning rods).

Experiments with the gold leaf electroscope, the electrophorus electrical condenser and the Leyden jar.

Simple notions of electrical potential.

CURRENT ELECTRICITY:

Experiments to show the production of an electric current by using cells having plates of different kinds.

Methods of determining the presence and the direction of electric currents (the galvanoscope), the effect of polarization of plates.

The Leclanché, dry and gravity cells.

Simple ideas of electromotive force, current strength and resistance.

Experiments on the electrolysis of water, electroplating, the measurement of current strength by the water and the copper voltameters.

The storage cell.

Experiments to show,—the magnetic effects of an electric current, the electro-magnet, the relation between the direction of the current and the polarity of an electromagnet, the magnetic field due to an electric current.

Construction and action of the D'Arsonval galvanometer, the electric bell, the telegraph key and sounder, the D.C. motor.

Experiments to show the transformation of electric energy into heat (the electric iron, the incandescent lamp).

Induced currents.

Experiments to show,—the production and direction of induced currents (Lenz's Law), the relation of primary and secondary currents, the electromotive force of induced currents, the construction and action of an induction coil, self-induction, the construction and action of the step-up and step-down transformer.

Long distance transmission of electricity as illustrated in the Hydro-Electric System of Ontario.

Electric measurements.

The volt, ohm, watt, and watt-hour.

Ohms' Law.

Construction and action of the ammeter, voltmeter, and Wheatstone bridge.

Special forms of radiation.

Electric waves as related to heat rays, light rays, ultra-violet and X-rays. Radiant energy. The wave theory.

Laboratory Equipment for Teaching Middle School Physics

Each group of two or three pupils should be provided with a set of apparatus consisting of the following:—

SOUND

- 1 Tuning Fork, C, unmounted.
- 1 Tuning Fork, A, unmounted.
- 2 Telescoping Brass Tubes, each about 15 inches long, large one $1\frac{1}{4}$ inches diameter.
- 1 Violin Bow.
- 2 Brass Plates, one square and one circular.
- 1 Clamp for Vibrating Plates.

HEAT

- 1 Air Thermometer Bulb.
- 1 Dew Point Apparatus.
- 1 Ball and Ring.
- 1 Compound Bar.
- 1 Calorimeter.
- 1 Chemical Thermometer, graduated in Centigrade and Fahrenheit degrees.
- 1 Pound Copper Shot or a copper block weighing about 500 grams.
- 1 Pound Lead Shot or a lead block weighing about 500 grams.
- 1 Leslie's Differential Thermometer.
- 1 Leslie's Cube.
- 1 Conductometer.
- 1 Spirit Lamp or Bunsen burner.
- 1 Retort Stand with two rings.

- 1 Sheet of Asbestos Gauze.
- 2 Beakers, 200 and 400 c.c.
- 1 Florence Flask, 300 c.c.
- 1 Yard Rubber Tubing, 3/16 inch inside.

LIGHT

- 1 Metre Stick.
- 1 Lens Support.
- 1 Screen Support.
- 1 Pin Support (rubber cork).
- 2 Mirror Supports.
- 1 Single Candle Holder.
- 1 Screen.
- 1 Bunsen Screen.
- 1 Paraffin Candle.
- 1 Pin Hole Camera.
- 1 Spherical Concave Mirror, 5 cm. in diameter, 25 cm. focal length.
- 1 Spherical Convex Mirror, 5 cm. in diameter, 25 cm. focal length.
- 2 Plain Glass Mirrors, 10 cm. x 15 cm.
- 1 Equilateral Prism.
- 1 Right-angled Prism.
- 1 Index of Refraction Plate, 10 x 6 x 2 cm.
- 1 Converging Lens, focal length 20 cm.
- 1 Diverging Lens, focal length 25 cm.
- 1 Plane Mirror, 4 inches x 1 inch.
- 2 Hat Pins.

ELECTRICITY AND MAGNETISM

- 2 Bar Magnets.
- 1 Horseshoe Magnet.
- 1 Magnet Board, with groove for magnet.
- 1 Shaker for Iron Filings.
- 1 lb. Fine Iron Filings.
- 1 Compass, 1-inch diameter.
- 1 Bar Soft Iron, round, 6 inches long.
- 1 Bar Soft Iron, round, 15 inches long.
- 1 Plate of Soft Iron, 6 x 8 x 1/4 inch.
- 1 Plate of Glass, 6 x 8 x 1/4 inch.
- 2 Knitting Needles.
- 1 Package Iron Tacks.
- 1 Set of Six Elements in electromotive series.
- 1 Galvanoscope.
- 2 Dry Cells.
- 1 Rheostat, circular, 10 ohms, to control battery current.
- 1 Spool Double Covered Magnet Wire, No. 20, to be used for making Electro Magnets, etc.
- 2 Small Incandescent Lamps (3 volts).
- 1 St. Louis Motor, or other dissectible type.
- 1 Set Telegraph Instruments (key and sounder).
- 1 Electric Bell.
- 1 Pair of Lead Plates, to illustrate storage cell.
- 1 Simple form of Electrolysis Apparatus.

- 1 Voltmeter, small.
- 1 Ammeter, small
- 1 Copper Voltmeter, simple.
- 1 Glass Friction Rod.
- 1 Vulcanite Friction Rod.
- 1 Flannel Exciting Pad.
- 1 Silk Exciting Pad.
- 1 Cat Skin.
- 1 Dozen Pith Balls.
- 2 Insulating Stands, for suspending Pith Balls.
- 1 Spool Silk Thread.
- 1 Electrophorus (small).
- 1 Electroscope, flash form.
- 1 Pair Condenser Plates.
- 1 Proof Plane.

General Physics Apparatus

In addition to the apparatus specified above. the Physics Laboratory should be supplied with the following pieces of apparatus for class demonstrations:

SOUND

- 1 Set of Sympathetic Tuning Forks, mounted.
- 1 Bell in Vacuo.
- 1 Kundt's Apparatus.
- 1 Savart's Wheel.
- 1 Interference of Sound Apparatus (Fig. 232, Text).
- 1 Siren.
- 1 Sonometer.
- 1 Whistle of Glass with Sliding piston and mouthpiece.
- 1 Organ Pipe, one side of glass, with membrane on sliding frame.
- 1 Resonance Jar.
- 1 Brass Rod with clamp to show longitudinal vibrations. 100 cm.
- 1 Coiled Spring to illustrate wave motion.

HEAT

- 1 Davy Safety Lamp.
- 1 Radiometer.
- 1 Convection Apparatus, for air.
- 1 Convection Apparatus, for liquids.
- 1 Wet and Dry Bulb Hygrometer.
- 1 Distillation Apparatus.
- 1 Hope's Apparatus.
- 1 Charles' Law Apparatus (Fig. 263, Text).

LIGHT

- 1 Optical Disc, with all attachments.
- 1 Bunsen Photometer.
- 1 Newton's Colour Disc and Rotator.
- 1 Projection Lantern for projecting both lantern slides and opaque objects.
- 1 Converging Lens, large, mounted on stand.
- 1 Large Glass Refraction Tank.
- 1 Direct Vision Spectroscope.

- 1 Quadruple Candle Support.
- 1 Shadow Photometer.
- 1 Diffusion Photometer.
- 1 Set of Coloured Glass Plates to illustrate absorption and transmission of light.

ELECTRICITY AND MAGNETISM

- 1 Wheatstone Bridge.
- 1 Resistance Box.
- 1 Natural Magnet.
- 1 D'Arsonval Galvanometer.
- 1 Tangent Galvanometer.
- 1 Ammeter.
- 1 Voltmeter.
- 1 Water Voltmeter (electrolysis of water apparatus).
- 1 Copper Voltmeter.
- 1 Large Induction Coil.
- 1 Arc Lamp, with simple Regulator.
- 1 Set of Coils for demonstrating the Laws of Current Induction.
- 1 Storage Battery.
- 1 Dissectible D.C. Motor.
- 1 Dipping Needle.
- 1 Gravity Cell.
- 1 Leclanché Cell.
- 1 Electrophorus (large).
- 2 Compass Needles, large, on stands.
- 1 Horseshoe Electromagnet.
- 1 The Elements of an Electric Iron.
- 1 Current Rectifier.
- 1 Model Transformer.
- 1 Lamp Rheostat Board.
- 1 Variable Rheostat.
- 1 Static Machine, Wimhurst.
- 1 Electric Plume.
- 1 Electric Chime.
- 1 Electric Whirl.
- 1 Faraday's Bag.
- 1 Set Biot's Hemispheres and hollow globe.
- 1 Insulated Conductor Ellipsoidal to show unequal distribution of charge.
- 1 Pair of Induction Spheres.
- 2 Leyden Jars.
- 1 Jointed Discharger.

CHEMISTRY

An experimental study of the following elements and their more important compounds: hydrogen, oxygen, sulphur, sodium, potassium, nitrogen, chlorine, bromine, iodine, carbon, calcium.

This experimental work should develop accuracy of observation and care in reaching conclusions. Copious notes are undesirable but the representation of apparatus, method, and results, by means of diagrams should be encouraged.

Study of the commercial value of the following elements and compounds: hydrogen, oxygen, nitrogen, chlorine, sulphur, carbon, nitric acid, sodium nitrate,

potassium nitrate, common salt, bleaching powder, hydrochloric acid, sulphuric acid, carbon dioxide, carbon monoxide, acetylene, coal gas, calcium carbonate, sodium hydroxide, sodium carbonate, gypsum.

An experimental study of: mixtures, solutions, compounds and elements; oxides, acids, bases and salts.

Fundamental laws and principles, as: conservation of weight, definite proportions, proportions by volume in which gases react; experiments on the law of definite proportions.

The quantitative meaning and use of chemical symbols, chemical equivalent, atomic weight, molecular weight, formulæ and equations.

Chemical nomenclature; valency.

Simple problems involving the calculation of formulæ, equations and percentage composition, the law of definite proportions and the changes in the volume of gases due to changes in temperature and pressure.

The course is covered in the Chemistry for High Schools and in the authorized Chemistry Manual. The pupils should perform all of the experiments in the Manual with the exception of those in the following exercises, which are optional:

11, 12, 13, 18, 22, 30, 41, 56, 64.

AGRICULTURE AND HORTICULTURE

Regulations

The Regulations for the Lower School apply also to the Middle School. Similar requirements as regards the instruction and examinations shall be met for both the Lower School and the Middle School, as follows:

- (a) Application for permission to introduce the work shall be sent to the Deputy Minister of Education, Toronto.
- (b) The instruction shall be given by a teacher who holds a Specialist's certificate or an Intermediate certificate in Agriculture.
- (c) The course is intended to extend over two years and the provision therefor in the teacher's time-table shall be at least three periods a week of 40 minutes each, or the equivalent thereof.
- (d) In addition to the school work, home projects, supervised by the teacher shall be carried out by pupils. Systematic records of this work shall be kept by the pupils.

The following are the details of the Course:—

PART I—(First Year)

Heat

Nature and Sources of Heat: Experiments to show that energy of motion (Kinetic energy), chemical energy, electrical energy, and radiant energy may be converted into heat.

The sun as a source of heat.

Temperature: Experiments to show the expansion and contraction of solids, liquids and gases due to changes in temperature; the temperature at which the density of water is at a maximum.

The principle of the internal-combustion engine.

Quantity of Heat: Quantity of heat as contrasted with temperature; heat unit (the calorie); specific heat.

Change of State due to Heat: experiments to illustrate the heat of fusion of ice and the heat of vaporization of water, cooling by evaporation, dew point.

Transference of Heat: experiments to show conduction and convection of heat, the absorption and emission of heat by different surfaces.

Light

Nature and Sources of Light: the transmission of light.

Experiments to show that light travels in straight lines through a medium of uniform density, the forming of shadows, the measurement of the intensity of light by means of a shadow or a diffusion photometer.

Reflection of Light: experiments to show the laws of reflection and the formation and position of an image in a plane mirror.

Refraction of Light: experiments to show refraction and the principle of the converging lens. The simple magnifying lens.

Light in Relation to Agriculture: the influence of light on the growth of plants, the colour of fruit, pathogenic bacteria and the growth of animals.

Magnetism

Experiments to show the laws of magnetic attraction and repulsion, magnetic lines of force, magnetic field, magnetism by induction, magnetization.

Electricity

Static Electricity: experiments to show electrical attraction and repulsion, the two kinds of electrification, conductors and non-conductors, electrification by contact and by induction, the residence of electric charges on the surfaces of conductors, the distribution of an electric charge on a surface, the escape of electric charges from points.

Means of preventing damage by lightning.

Experiments with the gold leaf electroscope, electrical condenser, and the Leyden jar.

Current Electricity: experiments to show the production of an electric current by using cells having plates of different kinds.

Methods of determining the presence and the direction of electric currents (the galvanoscope).

The dry cell.

Simple ideas of electromotive force, current strength and resistance. The ohm, the volt, and the ampere. Ohm's Law.

Care and use of the storage cell.

Experiments to show the magnetic effects of an electric current, the electromagnet, the relation between the direction of the currents and the polarity of an electromagnet, the magnetic field due to an electric current.

Construction and action of the electric bell and the D.C. motor.

Experiments to show the transformation of electric energy into heat (the electric iron, the incandescent lamp).

Induced currents: experiments to show the production and direction of induced currents (Lenz's Law) the relation of primary and secondary currents, the electromotive force of induced currents, the construction and action of an induction coil, self-induction, the construction and action of the step-up and the step-down transformer.

Long distance transmission of electricity as illustrated in the Hydro-Electric System of Ontario.

Mechanics

The principle and use of levers and pulleys.

Soil Physics

The effects of drainage on soil temperature, soil air, soil moisture and soil bacteria.

Botany

Parasitic fungi: the examination of spores and mycelia by means of a compound microscope; the recognition, from specimens, of rusts, smuts, late blight of potato, brown rot of stone fruits, mildew of cherry or lilac, anthracnose of bean.

The importance of pure seed.

Determination of the percentages of foul seed in three or four samples of clover (or alfalfa) and timothy.

Entomology

Life history, nature of injury wrought, and methods of control of the following injurious insects: white grub, wire worm, plum curculio, oyster shell scale, cabbage maggot, cabbage butterfly, European corn borer, tomato worm, tent caterpillar, aphides.

Life history and habits of the following beneficial insects: dragon fly, ichneumon fly, ladybird beetle.

Insecticides and Fungicides

Uses of arsenate of lead, arsenate of lime, Paris green, lime-sulphur, Bordeaux mixture, and orchard "dusts."

Field Crops

Different types of farming; crop distribution over Ontario, meaning and importance of crop rotation; influence of the keeping of live stock on the kind of rotation; germination tests of seed, e.g., oats, turnips, corn, clover; laboratory work in seed judging and seed selection; meaning and merits of pasture crops, silage crops and soiling crops.

PART II—(Second Year)

Chemistry: an experimental study of the following elements: carbon, oxygen, hydrogen, nitrogen, chlorine, iodine, phosphorous, sulphur, sodium, potassium, calcium, and the compounds of these elements that have a direct bearing upon agriculture, such as carbon monoxide, carbon dioxide, water, ammonium hydroxide, ammonia gas, ammonium sulphate, nitric acid, hydrochloric acid, phosphorus pentoxide, sulphur dioxide, sulphuric acid, sodium chloride, sodium nitrate, sodium hydroxide, sodium carbonate, sodium bicarbonate, potassium chloride, potassium nitrate, potassium hydroxide, calcium oxide, calcium hydroxide, calcium carbonate, calcium bicarbonate, calcium sulphate, the calcium phosphates.

A study of the industrial methods of preparation of the above compounds is not required.

The determination of the chemical equivalent of an element (magnetism).

The quantitative meaning and use of chemical formula and equations; chemical nomenclature; simple arithmetical problems involving formulæ and percentage composition.

Formation and texture of soil; soil profile, losses of plant nutrients (nitrogen, phosphorus, potassium and calcium compounds) by leaching and cropping; addition of nitrogen by rainfall and soil organisms (root organisms included); nitrification; acidity,—its detection and correction; influence of nitrogen, phosphorus and potassium on plant growth; need of plant nutrients as influenced by the growing period of the plant, range of root and ability to obtain the nutrients required.

Barnyard Manure and Fertilizers: composition, care and treatment of barnyard manure; commercial sources of nitrogen, phosphorus and potassium used to supplement barnyard manure; test for nitrates, phosphates and potassium salts; experiments to prove the presence of and to show the relative solubility of the various forms of phosphates. Experiments to show why certain fertilizers should not be mixed; calculation of the amounts and cost of materials required to make fertilizer mixtures of different percentage composition; explanations of the commercial terms "phosphoric acid" and "potash." The Fertilizers Act, 1922, sections 1, 2, 3, 4, 5, 8.

Poultry: practical operation of the incubator—ventilation, provision for moisture, the candling of eggs, the examination of eggs broken open every one or two days during the period of incubation to observe the development of the embryo. Methods of preserving eggs; the grading of eggs; poultry products and marketing; culling of poultry for egg production.

Dairying: principles and uses of the Babcock machine and the lactometer; testing cream and skim milk for fat; determining whether milk has been watered by use of the formula—L.R. at 60 degrees plus % of fat divided by 4 equals S.N.F.; food value of milk and its products; principle and use of the milk separator; making butter with a laboratory churn; use of starters.

Animal Husbandry: the chief breeds of draught horses, cattle, sheep, swine; value and importance of live stock; a survey of the breeds found in the locality; meaning of pedigree stock and grade stock; disadvantage of keeping scrub stock; visit to a local farm to study the stock kept there.

OR

Horticulture: orchard management—spraying, pruning, grafting, cultivating; cover crops; packing and marketing apples; methods of producing early vegetables; practice in seeding, transplanting, cultivation, mulching; a visit to a fruit farm or a market garden to study the methods employed there.

LATIN AND GREEK

In the third year the courses in grammar and composition, begun in the Lower School are to be continued. The introductory lessons in the Latin book should be completed during the year, and the reading of Cæsar continued. Special attention should be paid to Sight Translation and regular periods assigned thereto.

In the fourth year the work prescribed for the Middle School examination should be completed. Attention is directed to the prescription as outlined in the Curriculum for Matriculation issued by the several universities.

FRENCH, GERMAN, SPANISH, ITALIAN

The methods outlined in connection with the Lower School courses should be continued, as far as possible, in the Middle School. For details of the courses, teachers should consult the Curriculum for Matriculation issued by the several Universities.

A.—FRENCH:

The texts prescribed.
Composition.
Sight work.

The course in Grammar upon which the examination in French Composition of the Middle School is based, consists of 51 chapters of the present prescribed Grammar, together with the common irregular verbs. The continuous passages of English for translation into French will be based on the prescribed texts.

B.—GERMAN:

The texts prescribed.
Composition.
Sight work.

The course in Grammar upon which the examination in German Composition of the Middle School is based, consists of the following parts from the Revised Edition of the High School German Grammar:

Exercises 1-25, with special emphasis on 1-18 inclusive; Reading Selections 122-132; the first 10 Topics; the common Irregular Verbs.

The Grammar, beginning on page 156, is intended to be for reference only and to be used by the student in this way. No definite amount can be assigned, but special attention should be given to the parts which have reference to exercises 1-18. The continuous passages of English for translation into German will be based on the prescribed texts.

C.—SPANISH:

The texts prescribed.
Composition.
Sight work.

The course in Grammar upon which the examination in Spanish Composition is set consists of the first 40 lessons of the Spanish Grammar together with lesson 47 and the common Irregular Verbs. The continuous passages of English German will be based on the prescribed texts.

D.—ITALIAN:

The texts prescribed.
Composition.
Sight work.

The continuous passages of English for translation into Italian will be based on the prescribed texts.

ART

Note.—The following is suggested as a suitable course in Art in the Middle School. It will not be accepted for admission to the Normal Schools or to the Universities, but may be used for the purposes of the Graduation Diploma. When used for these purposes sections I and III are obligatory, and an option is allowed between section II and section IV.

I. Freehand Drawing: review of such parts of the Lower School course as may be found necessary.

Mediums: pencil and water colour with such other mediums as the teacher may approve.

Freehand drawing in outline, in neutral values and in colour, of studies selected from the following:

- (1) Still life groups.
- (2) Characteristic Canadian trees in their immediate natural setting, maple, elm, oak.
- (3) Foliage and fruit of such trees as the pine, cedar, larch, maple and oak.
- (4) Smaller domestic animals such as the cat, dog *or* rabbit; or examples from the school museum such as the squirrel, mink *or* raccoon.
- (5) Articles of furniture such as chairs, tables and buffets.
- (6) Articles of apparel such as coats, hats and boots.
- (7) Room interiors.
- (8) Building exteriors.
- (9) Casts of ornament.

Careful attention shall be given:

- (1) To the expression of light and shade, texture, and character.
- (2) To grouping.
 - (a) From study of scattered objects to draw a well-composed group.
 - (b) To draw from memory a group of common objects to illustrate a subject such as "gardening," "preserving," "music."
- (3) Memory drawing.
- (4) Figure drawing should be encouraged wherever special ability is shown.

II. Design.

Review of such parts of the Lower School course as may be found necessary.

Mediums:

Pencil, water colour, lettering pen and waterproof India ink.

(Tempera colours may be substituted for ordinary water colours where considered more suitable).

A. Principles of Design.

Practice in the principles of design may be given in a selection from the following:

- (1) Designs for embroidery, beading and braiding for dress and dress accessories.
- (2) Designs for the doilies, runners, cushions and curtains and other home furnishings.
- (3) Designs for ornamental ironwork, as for fences, gates, brackets, hinges, registers, ornamentation on wood as on trays, book-ends, tea-pot stands.

- (4) Designs for the decoration of the printed page:
- (a) Variations of the classic Roman alphabet.
 - (b) Book-plates.
 - (c) Trade-marks and calligrams.
 - (d) Posters and window show-cards.
 - (e) Simple illumination.
 - (f) Head pieces and tail pieces.

Teachers may substitute (4) above for (1), (2), and (3) above.

- (5) Designs developed from a study of historic Greek ornament.

Colour sense may be developed:

- (1) In the perception of colour in natural forms such as the leaf, fungus, shell, rock, feather, butterfly.
- (2) In the creation of colour schemes for home and school decoration.
- (3) In the application of these colour schemes to design.

B. Practical Application of Design.

The following are recommended:

- (1) The cutting of stencils for the transfer of patterns to objects of use and adornment.
- (2) The modelling of simple forms in clay or plasticine.
- (3) The designing, and moulding in coloured cement of simple tile patterns.

III. Appreciation.

A comparative study of masterpieces of painting, of sculpture, of the outstanding characteristics of the principal styles of architecture, and of the leading periods of furniture.

IV. Applied Mechanical Drawing.

- (1) Care and use of mechanical instruments: the dividers, the compass, the ruling pen, the bow-pen, the scale, the T-square, the set square (30° and 45°), the French curve.
- (2) (a) The conventional lines used in making and dimensioning working drawings.
- (b) The conventional lining of sections of the various kinds of material.
- (3) The practice of a style of freehand lettering founded upon the single stroke Gothic, inclined and vertical.
- (4) The working of basic problems such as:—
 - 1. To bisect a straight line.
 - 2. To erect a perpendicular to a given line at a given point in the line.
 - 3. To draw a perpendicular to a given line from a point outside the line.
 - 4. To erect a perpendicular to a given line from a point at its end.
 - 5. To draw a line parallel to a given line at a given distance from it.
 - 6. To construct an equilateral triangle on a given base.
 - 7. To construct a square on a given base.
 - 8. To inscribe a square within a given circle.
 - 9. To bisect a given angle.
 - 10. To trisect a right angle.
 - 11. To construct at a given point in a given line an angle equal to a given angle.
 - 12. To divide a given line into any number of equal parts.
 - 13. To inscribe a regular hexagon within a given circle.
 - 14. To construct a regular hexagon upon a given line.
 - 15. To construct a regular octagon within a given square.

16. To draw a tangent at any point in a given circumference.
 17. To inscribe a circle within a given triangle.
 18. To construct an equilateral triangle when the altitude is given.
 19. To circumscribe a square about a given circle.
 20. Within a given circle to draw any number of equal circles tangent to each other and to the given circle.
 21. To draw an ellipse whose axes are given.
 22. To draw an egg-shaped oval.
 23. To draw a spiral.
- (5) Orthographic projection of type solids and of a few common objects.
 1. To draw top view, front view, and when required, side view of a cube, a pyramid, a cylinder, a cone, and a hexagonal prism.
 2. To make a working drawing and surface pattern,—
 - (a) of a funnel.
 - (b) of a two-part right-angled elbow.
 - (c) of a lamp shade.
 - (6) The designing and drawing of patterns with a geometric treatment:
 - (a) in a square and rectangle and circle;
 - (b) of repeating surface patterns;
 - (c) of borders (fret, Guilloche, wave).
 - (d) of tracery of Gothic windows.
 - (7) The drawing of cross sections and of elevations of simple standard mouldings.
 - (8) Working drawings:
 1. Of metal such as screw threads, bolt heads and nuts; easy machine parts; tools, such as wrench and plane.
 2. Of wood, such as mallet, clamp, book-stall, table, cabinet.
 - (9) Architectural drawings:
Plans and elevations of a cottage or a bungalow, with details of doors and windows.
 - (10) Historic and modern forms of the arch.

MUSIC

The Lower School Course continued and extended. The following are the details of the course:

To harmonize a figured bass in four parts using common chords and chords of the dominant seventh with their inversions. The bass may include modulations to nearly related keys, suspensions and passing notes.

To harmonize a simple melody in four parts. This may include suspensions and unaccented passing notes but no modulations.

To answer general questions on the life and works of one composer and to display a knowledge of a specified work by that composer. Such questions only will be set as may serve to test the candidate's familiarity with an intelligent and appreciative comprehension of the prescribed work.

The name of the composer whose life and work are to be studied is specified in the Matriculation Calendar of the University of Toronto.

BOOKKEEPING AND PENMANSHIP

The Lower School Course continued and extended.

STENOGRAPHY AND TYPEWRITING

The Lower School Course continued and extended.

MANUAL TRAINING

The Lower School Course continued and extended.

HOUSEHOLD SCIENCE

The Lower School Course continued and extended.

UPPER SCHOOL SUBJECTS

ENGLISH COMPOSITION

The Middle School Course continued and extended.

The principles of composition systematically studied.

Notes.—1. Good composition in all written work and clear and comprehensive answers in all oral work should be demanded by every teacher. 2. For the study of models of prose writing the volume of Short Stories and Essays will be found useful.

2. The question paper in English Composition will consist of two parts, A and B. Candidates will be required to write an essay on one of several themes given in each of the two parts of the paper, that is. each candidate will hand in two short essays instead of one long essay.

The themes given in Part A of the paper will be suitable for essays narrative and descriptive in character. The themes given in Part B will be suitable for essays expository and argumentative in character.

Each essay should be about two pages or about 300 words in length.

ENGLISH LITERATURE

Intelligent and appreciative study of suitable authors, both prose and poetry, including those prescribed for the Departmental and University Matriculation examinations.

Systematic oral reading by pupils of the texts studied in class.

Supplementary reading provided by the pupils themselves or supplied from the school and the public library.

Memorization and recitation of choice selections in prose and poetry prescribed by the Department and of others made by the teacher.

Note.—At this stage the pupil should have acquired some power of appreciating literature and literary art; but the chief object continues to be the cultivation of a taste for good literature, and critical study should be subordinated thereto.

MODERN WORLD HISTORY, 1789-1920

Note.—The course in Modern World History includes the geography relating to the History prescribed.

1. (a) A survey of political and social conditions in France on the eve of the French Revolution. A brief comparison with conditions in Great Britain.

(b) The French Revolution, 1789-1799, and its influence on the British and other peoples.

2. The Napoleonic Era, 1799-1815.

3. European History, 1815-1848: Metternich and the reaction after 1815; the growth of Liberalism and Nationalism; the Revolutions of 1848.

4. European History, 1848-1875: Italian Unity—Mazzini, Garibaldi, Cavour; the rise and fall of the Second Empire and the foundation of the Third Republic in France; Bismarck and German unity.

5. The Industrial Revolution in Great Britain, 1750-1850.

6. The progress of parliamentary and social reform in Great Britain and Ireland during the period.

7. The expansion and political development of the British Empire, 1789-1920.

8. A brief treatment of the following topics in the history of the United States: Westward expansion; the Civil War; the Munro doctrine.

9. International relations, 1870-1914; the formation of the rival alliances and the causes of the Great War.

10. The War, 1914-1918; the peace treaties; the League of Nations.

Books of Reference

Modern Europe and the World. R. Flenley. J. M. Dent & Sons, Toronto.
A History of Modern Times from 1789 to the present day. D. M. Kettelbey, Clarke, Irwin & Co.

ALGEBRA

The course of the Middle School reviewed and extended.

Linear factors of a polynomial and numbers giving it the value zero.

Ratio, proportion and variation.

Series: arithmetic, geometric, arithmetico-geometric, harmonic, powers of natural numbers.

Maxima and minima.

Permutations and combinations.

Binomial Theorem: general statement of, but proof for positive integral exponents only, applications for all exponents.

Interests forms and annuities.

GEOMETRY

Note.—Part C is required of all candidates; an option is allowed between Part A and Part B.

Part A. Synthetic Geometry

Exercises on the course prescribed for the Middle School. The following topics with exercises thereon: loci; maxima and minima; the system of inscribed, escribed, and circumscribed circles of a triangle; radical axis; harmonic ranges and pencils.

The following propositions in Synthetic Geometry, with exercises thereon:

To divide a given straight line internally and externally in medial section.

To describe a square that shall be equal to a given rectilineal figure.

To describe an isosceles triangle having each of the angles at the base double of the third angle.

To inscribe a regular pentagon in a given circle.

The squares on two sides of a triangle are together equal to twice the square on half the third side and twice the square on the median to that side.

If ABC be a triangle, and A be joined to a Point P of the base such that $BP : PC = m : n$, then $n AB^2 + m AC^2 = (m+n) AP^2 + n BP^2 + m PC^2$.

In a right-angle triangle the rectilineal figure described on the hypotenuse is equal to the sum of the similar and similarly described figures on the two other sides.

If the vertical angle of a triangle be bisected by a straight line which also cuts the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the segments of the base, together with the square on the straight line which bisects the vertical angle.

If from the vertical angle of a triangle a straight line be drawn perpendicular to the base, the rectangle contained by the sides of the triangle is equal to the rectangle contained by the perpendicular and the diameter of the circle described about the triangle.

The rectangle contained by the diagonals of a quadrilateral inscribed in a circle is equal to the sum of the two rectangles contained by its opposite sides.

If two similar polygons have the sides of one respectively parallel to the corresponding sides of the other, the straight lines joining corresponding vertices are concurrent.

If a transversal cut the sides, or the sides produced, of a triangle, the product of one set of alternate segments taken in circular order is equal to the product of the other set, and conversely. (Menelaus' Theorem).

If from the vertices of a triangle concurrent straight lines be drawn to cut the opposite sides, the product of one set of alternate segments taken in circular order is equal to the product of the other set, and conversely. (Ceva's Theorem).

If a point A lie on the polar of a point B with respect to a circle, then B lies on the polar of A .

Any straight line which passes through a fixed point is cut harmonically by the point, any circle, and the polar of the point with respect to the circle.

In a complete quadrilateral each diagonal is divided harmonically by the other two diagonals, and the angular points through which it passes.

Part B. Solid Geometry

Definitions: general description of figures in three dimensions. The following propositions, with exercises thereon:

A plane is determined by (a) three points not in a straight line, (b) a straight line and a point not on it, (c) two intersecting straight lines, (d) two parallel straight lines.

Two intersecting planes cut one another in a straight line and in no other point.

If two straight lines are parallel, any plane intersecting one of them intersects the other.

If two planes are parallel, any straight line intersecting one of them intersects the other.

If a straight line is perpendicular to two intersecting straight lines at their point of intersection, it is perpendicular to every straight line in their plane through their point of intersection.

Conversely, all straight lines intersecting a given straight line at a given point and perpendicular to it lie in a plane.

If one of two parallel straight lines is perpendicular to a plane, the other is also.

Conversely, if two straight lines are perpendicular to the same plane, they are parallel.

If a straight line be at right angles to a plane, any plane through the line is perpendicular to the plane.

To draw a perpendicular to a given plane from a given point.

One and only one straight line can be drawn through a given point and perpendicular to a given plane.

The perpendicular from a given point to a plane is the shortest distance from the point to the plane.

If two straight lines are parallel to the same straight line they are parallel to each other.

If two intersecting straight lines are parallel respectively to two other intersecting straight lines the contained angles are equal.

If two planes have a common perpendicular they are parallel, and conversely.

If two intersecting straight lines are respectively parallel to two other intersecting straight lines, the plane of the first two is parallel to the plane of the second two.

Straight lines which are cut by three or more parallel planes are cut proportionally.

To draw a perpendicular to two given straight lines not in the same plane.

There is only one common perpendicular to two straight lines not in the same plane.

In a trihedral the sum of any two angles at the vertex is greater than the third; and the sum of the three angles is less than four right angles.

In a polyhedron the sum of the number of faces and the number of corners or vertices is two greater than the number of edges.

There are not more than five regular polyhedra.

The four diagonals of a parallelopiped are concurrent and bisect one another.

The four straight lines which join vertices of a tetrahedron to the centroids of the opposite faces meet in a point which divides them in the ratio of 3:1; and the three straight lines which join the middle points of opposite edges meet in the same point and are bisected there.

Any plane section of a pyramid taken parallel to the base is similar to the base, and the area of such a section varies as the square of its distance from the vertex.

The volumes of two pyramids of equal heights and equal base areas are equal.
One sphere and only one can pass through four points not in the same plane.

Mensuration of volumes, surfaced areas, linear measurements including the development of the formulæ, in the following: Prism, pyramid; cylinder; cone; frustum of cone, pyramid or sphere; zone of sphere.

Part C. Analytical Geometry

Axes of co-ordinates. Position of a point in plane of reference.

Transformation of co-ordinates—origin changed or axes (rectangular) turned through a given angle.

Area of a triangle in terms of the co-ordinates of its angular points.

Co-ordinates of the point dividing a straight line in a given ratio.

The distance between two points.

The various forms of the equation of a straight line.

The angle between two given straight lines.

Conditions of perpendicularity and of parallelism.

Distance from a point to a straight line along a given direction.

Perpendicular distance from a point to a straight line.

The various forms of the equation of a circle.

Tangent at a point and from a point.

Tangent in a given direction.

Polar of a point.

If a point moves along a straight line, its polar revolves about the pole of that line.

The length of the tangent from a point to a circle.

The radical axis of two circles.

Easy exercises on the preceding.

TRIGONOMETRY

Measurements of angles: the right angle and the radian.

Trigonometrical ratios, relations among them, ratios of certain angles such as 30° , 45° , 60° , 150° , 210° , 330° .

Ratios of the sum and difference of angles, deduced formulæ.

Relations between sides and angles of a triangle.

Use of logarithms.

Solutions of triangles, with problems.

Area of a triangle.

Circumscribed, inscribed and escribed circles.

Inverse functions.

Easy exercises on the preceding.

PHYSICS

A course defined as follows, the topics to be presented experimentally with mathematical applications simple and direct in character:

Mechanics of Solids

Metric and English units of length. Use of vernier calipers, screw-gauge, in measurement of wires, cylinders, spheres, plates, etc.; unit of time.

Motion: velocity, uniform and variable; average velocity; velocity at a point.

Newton's first law of motion, force, inertia, and mass; metric and English units of mass.

Acceleration measurement of uniform acceleration, acceleration due to gravity, value of g .

Momentum: Newton's second law, measurement of force, metric and English absolute and gravitational units of force.

Newton's third law; conservation of momentum; centripetal and centrifugal force with illustrations, centrifuge, cream separator, form of earth, etc.

Composition and resolution of forces; parallelogram of forces; triangle of forces; moments, couples; centre of gravity.

Friction; laws of friction; co-efficient of friction.

Gravitation: Newton's laws of gravitation; Cavendish's experiment.

Work: measurement of work in metric and English absolute and gravitational units; energy; measurement of energy; kinetic and potential energy; conservation of energy.

Power: measurement of power; horse power; the watt.

Machines: mechanical advantage; lever; wheel and axle; pulley; inclined plane; screw; wedge; simple combinations of the foregoing.

Mechanics of Fluids

Pressure: pressure at a point; Pascal's law; pressure due to gravity; equilibrium of fluids at rest; Archimedes' principle; buoyancy; hydraulic pressure; specific gravity; determination of specific gravity of solids and liquids.

Atmospheric pressure: Barometers; weight of air; pressure due to molecular motion; lift and force pumps; siphon; the use of compressed air, airbrakes, air tools.

Velocity due to pressure: Torricelli's theorem; pressure in a moving column of fluid varies with the velocity; application to explain the principle of the atomizer, the Bunsen burner, the Bunsen filter pump, forced draught, the curved flight of a ball.

Surface tension; surface force; surface energy; capillarity; practical applications.

Transformation of Energy

Mechanical equivalent of heat, measured mechanically and electrically; measurement of electrical energy; the kilowatt hour.

Laboratory Equipment for Teaching Upper School Physics

MECHANICS AND PROPERTIES OF MATTER

Apparatus for determination of average velocity and acceleration.

Apparatus to show relation of force to acceleration.

Guinea and Feather Tube.

Apparatus to determine acceleration due to gravity.

Apparatus for demonstrating parallelogram, triangle and polygon of forces.
 Apparatus for investigating parallel forces.
 Apparatus for demonstrating laws of friction.
 Air Pump and Receiver.
 Elastic Rubber Balloon. A toy balloon answers well.
 Transmission of Pressure Apparatus.
 Apparatus for demonstrating equilibrium of fluids under action of gravity.
 Apparatus for determination of whole pressure.
 Archimedes' Principle.
 Globe for weighing air.
 Barometer Tube, heavy glass.
 Standard Barometer.
 Mariotte's Law Tube.
 Lift Pump, glass model.
 Force Pump, glass model.
 Hydraulic Press, glass model.

SURFACE TENSION AND FLOW OF FLUIDS

Capillary tubes, set of.
 Small and large tube connected.
 Glass cell and "pill-box" pulley.
 Surface tension wires.
 Separating funnel.
 Two-compartment cell, for projection.
 Apparatus of vertical jet (Torricelli's).
 Tube of varying size with pressure tubes.
 Atomizer.
 Jet Pump, glass model.
 Bunsen jet pump.
 Hollow glass bulbs, set of 4.

CHEMISTRY

Chemistry of the Middle School review and continued.

Rate of reaction and conditions that affect in (including catalysis), e.g., the action of oxalic acid in the presence of sulphur acid on a dilute solution of potassium permanganate; the souring of milk.

Reversible reactions, chemical equilibrium and the conditions that effect equilibrium, e.g., ice \rightleftharpoons water, water \rightleftharpoons water vapour, ice \rightleftharpoons water vapour, a salt (sodium sulphate) in equilibrium with a saturated solution, limestone \rightleftharpoons quicklime and carbon dioxide, bluestone \rightleftharpoons anhydrous copper sulphate and water, ferric chloride and ammonium sulphocyanate \rightleftharpoons ferric sulphocyanate and ammonium chloride (in solution).

A study of the following elements and their compounds illustrated as far as possible by laboratory experiments and having regard to Mendelejeff's classification: hydrogen, sodium, potassium, magnesium, zinc, calcium, aluminium, carbon, lead, nitrogen, phosphorus, arsenic, antimony, oxygen, sulphur, chlorine, bromine, iodine, iron, copper, silver.

Qualitative Analysis:

The detection of the metal and the acid radical in solutions of the following salts: lead nitrate, silver nitrate, copper sulphate, antimony chloride, arsenic chloride.

iron sulphate, aluminium sulphate, zinc chloride, magnesium sulphate, sodium sulphite, potassium carbonate, ammonium phosphate.

Vapour tension (pressure):

The vapor tension of (1) benzene, (2) water, (3) water and benzene as determined by introducing a few drops of the several liquids into the vacuum of a mercury barometer.

Elementary notions of dissociation (ionization) as derived from such experiments as the following: the change in colour due to the gradual dilution of a water solution of copper bromide or copper chloride, the precipitation of barium chloride from a solution of barium chloride by the addition of hydrochloric acid, electrolysis.

Hydrolysis, as illustrated in the acid reaction of a solution of copper sulphate and the alkaline reaction of a solution of washing soda.

A study of the properties and uses of the following commercially important compounds: sodium chloride, baking soda, washing soda, caustic soda, potassium nitrate, sodium nitrate, potassium permanganate, magnesium sulphate, zinc sulphide, zinc oxide, calcium carbide, plaster of Paris, alum, white lead, ammonium nitrate, superphosphate of lime, white arsenic, lead arsenate, steel, bluestone.

The following processes in the extraction of a metal from its ore; roasting, reducing, electrolysis and solution, as exemplified in the extraction of iron, zinc, lead, nickel, aluminium, copper and gold.

Organic Chemistry:

Alcohols, acids and esters (fats); methyl alcohol, ethyl alcohol, glycerine, acetic acid, stearic acid, ethyl acetate, tallow and lard.

Soap making.

Carbohydrates: glucose, cane sugar, starch, cellulose.

Hydrolysis of starch.

Proteins as constituents of food such as milk.

These organic compounds should be treated from the descriptive point of view and few formulas should be used.

Note.—It is suggested that the topics under “Organic Chemistry” be not treated more exhaustively than they are in such text-books as:

Alexander Smith’s Chemistry.

An Elementary Study of Chemistry—Revised Edition—by McPherson and Henderson.

Elementary Principles of Chemistry, by Brownlee, Fuller, Hancock, Gohon. Whitsit.

Everyday Chemistry, by J. R. Partington.

BOTANY

Experimental Physiology.

Practical studies of osmosis, transpiration, photo-synthesis, respiration, geotropism, phototropism, regions of growth in stem and root.

Morphology and Physiology:

Plant cells: study of a normal cell and a plasmolysed cell. Structure and general functions of the following plant organs: leaf, root, stem, flower, seed, fruit. Modification of roots, stems, and leaves for the special functions of storage and support. Light relations of leaves. Stipules, spines, tendrils and bud scales. Underground stems, comparison of roots and stems. Pollination and adaptations for cross-pollination. Fertilization, seed dispersal, vegetative reproduction as

contrasted with sexual and spore reproduction. Study of typical seeds. Classification of fruits. A study by means of sections of the cellular structure of the leaf and of the relative arrangement of the more important tissues and tissue systems of the stem and root of bean and maize, or of any other typical dicotyledon and monocotyledon.

Cryptogams:

The practical study of representatives of the chief subdivisions of the cryptogams; spirogyra, a mushroom, a lichen, a livewort, a moss, a horsetail, a clubmoss and a fern. Distribution and economic importance of yeasts and bacteria. Microscopic structure of the yeast plant.

Recognition, mode of life, reproduction, economic importance and control of the following parasitic fungi: grain rust, loose smut of oats *or* corn smut, apple scab and black knot.

Spermatophytes:

The practical study of representatives of the seed plants of the locality, including at least one member of each of the following orders: Pinaceæ, Gramineæ, Liliaceæ, Ranunculaceæ, Cruciferae, Rosaceæ, Leguminosæ, Aceraceæ, Umbelliferae, Labiatae, Scrophulariaceæ, Compositæ.

Ecology:

Relation of the structure of plants to their environment as in mesophytes, hydrophytes, xerophytes.

Characteristics of these plant associations and a comparison of the ecological with the structural classification of plants.

Classification:

The placing of the types studied in their natural divisions; characteristics of these divisions.

Reference Books

Botany for High Schools. Cosens and Ivey.
Principles of Botany. Bergen and Davis.
Nature and Development of Plants. Curtis.

ZOOLOGY

Practical study of the external form of all types, and the dissection or the study of prepared specimens (or models), as specified below. Observational drawings are essential.

Mode of life of the various types. Reasons for including these types in their respective groups.

Protozoa:

Amoeba (or paramoecium): practical study of the living animal—habitat, movements, structure, functions and life history.

Mollusca:

Fresh-water clam: practical study of the living animal—habitat, habits, movements of shell, locomotion, action of siphons. Structure and markings of shells. Dissection to show mantle, foot, gills, muscles, digestive system, heart, cloaca. Life history.

Vermes:

Earthworm: practical study of the living animal—habitat, habits, external features, locomotion. Dissection to show internal organs. Study of a cross-section posterior to the gizzard. Mode of respiration.

Arthropoda:

Crayfish: practical study of the living animal—habitat, habits, locomotion. Segmentation and external features, including appendages and organs of respiration. Mode of respiration. Life history.

Grasshopper: practical study of living animal—habitat, habits, locomotion. Segmentation and external features, including appendages, mouth parts, wings and organs of respiration. Mode of respiration. Life history.

Comparison of the millipede, the spider, the grasshopper and the crayfish in the following points: (a) body divisions and segmentation, (b) mouth parts, (c) organs of locomotion.

A study of the cricket, May beetle, monarch butterfly, ant and mosquito, ladybird beetle, dragon fly, berry bug, ichneumon fly as a basis for the classification of insects into the following orders: Orthoptera, Coleptera, Adonata, Diptera, Lepidoptera, Hemiptera and Hymenoptera.

Chordata:

Pisces; practical study of a living fish, e.g., a perch or a gold fish—balancing locomotion, respiration. External features, with special attention to adaptation to environment and habits. Organs of respiration, circulation, digestion, excretion. Swim-bladder.

Amphibia:

Practical study of a living frog—locomotion, breathing, circulation of blood through the web of the foot. Practical study of the external features and skeleton. Dissection to show organs of respiration, circulation, digestion and excretion, and the central nervous system. Life history of a frog and a toad.

Reptilia:

Practical study of the external features, including mouth parts, of a snake and a turtle, with special reference to environment and to habits.

Aves:

Practical study of the external features, plumage and skeleton of some common bird. Adaptations to flight, with special reference to the form, skeleton and organs of respiration. Digestion. Chief types of bills and feet.

Mammalia:

Practical study of (a) chief features of the skeleton, (b) organs of respiration, circulation, digestion and excretion, of a rabbit *or* a cat.

Comparison of the brain of a rabbit *or* a cat with that of a bird, and that of a frog.

Study of a mammalian eye from a specimen or from a model.

Note 1.—Except in the case of the clam, the earthworm and the frog, where dissection is required, prepared specimens or models may be used. The cross-section of the earthworm should be studied with the low power microscope.

Note 2.—The order in which the above topics are to be studied should be determined by the supply of materials, the local conditions, etc.

Reference Books

Zoology for High Schools. Calvert and Cameron.
 Zoology, Descriptive and Practical. Colton.
 Textbook of General Zoology. Curtis.

LATIN AND GREEK

The courses of the Middle School in grammar and composition continued.

The Authors prescribed for the Upper School examination.

Sight work should form an important part of the course and should receive regular attention throughout the year.

FRENCH, GERMAN, SPANISH, ITALIAN

The courses of the Middle School in grammar and composition continued.

The authors prescribed for the Upper School examination.

Sight Work.

For details of the courses teachers should consult the Curriculum for Matriculation of the several universities.

LOWER, MIDDLE AND UPPER SCHOOL EXAMINATIONS

Notes.—(1). The machinery for the conduct of the Middle and Upper School examinations is provided by the Department of Education.

The machinery for the conduct of the Lower School examination is provided by High School Entrance Boards as set forth in Circular 77.

(2) The Universities and the Learned Societies select the papers that will meet their requirements for admission.

(3) On request, addressed to the Deputy Minister, the results of the Departmental examinations in which they are concerned are communicated by the Department to the Universities and the Learned Societies.

Examiners-in-Chief and Associate Examiners

1.—(1) The Examiners-in-Chief to set the question papers for the Lower, Middle and Upper School examinations, and the Associate Examiners to value the answer papers of the candidates for Middle and Upper School examinations will be appointed by the Minister of Education.

(2) The Associate Examiners to value the answer papers of candidates for the Middle and Upper School Examinations shall be holders of Permanent High School certificates or of Permanent First Class certificates, who have had at least two years' experience in High or Continuation School Work, and are actually engaged in teaching in the Normal, High, Continuation or Vocational Schools.

(3) No Associate Examiner will be appointed to value the answer papers in a subject which he is not actually engaged in teaching.

(4) The valuation of the Middle and Upper School answer papers will be conducted at the Department under instructions from the Minister.

Examination Centres and Dates

2.—(1) Subject to the conditions hereinbefore contained and in accordance with a time-table to be issued by the Minister from time to time, written examinations, as defined below, in the subjects of the Middle, and Upper School courses will be held annually by the Department of Education, at each High School and Collegiate Institute, and at such other centres as the Minister may approve on the recommendation of the Public School Inspector or of the Senate of an Ontario university.

(2) The examinations at each local centre shall be conducted, and the cost thereof paid, under instructions from the Minister.

Examination Fees

3.—(1) For the Middle and Upper School examinations the fees are \$1.00 per paper (except in the Districts and the provisional County of Haliburton, where the fees are 75c. per paper) with a maximum of \$10.00 for the Middle and \$15.00 for the Upper, or for any combination of the Middle and Upper School examinations. The fees for the Lower School examination conducted through High School Entrance Boards are \$1.00 per paper (in a District or in a Provisional County, 75c. per paper), with a maximum of \$5.00.

(2) The prescribed fee shall be paid to the Presiding Officer, and shall be forwarded to the Public School Inspector, who shall pay 60 per cent. of the Middle and Upper School fee to the Department of Education and 40 per cent of this fee together with the entire Lower School fee to the Board of the school at which the examination is held.

(3) An additional fee of \$1.00 will be imposed if the application is made after the prescribed date.

Application for Admission

4.—Application for admission to the Middle and Upper School examinations shall be made not later than the first day of May to the Public School Inspector on an official form which may be obtained from him or from the Principal of the School which the applicant attends.

Official forms for reporting the lists of candidates for the different examinations will be sent to the Public School Inspector.

Note.—Lower School candidates are not required to submit formal applications. Principals shall make out and forward, on a form to be provided, lists of such candidates to the Public School Inspector.

Limitations of Admission

5.—An applicant may not be admitted to the examination in English Literature prescribed for the Middle or Upper School examination unless he complies with the following conditions:

(1) In the case of teachers who are actually and regularly engaged in teaching, the official form of application shall include a certificate, signed by the applicant, that he has read carefully during the preceding year, in addition to the works

prescribed for the examination, at least four suitable works in English Literature, at least one of which shall be poetry, and the names of the books and the authors shall be given in said certificate.

(2) In the case of other applicants, the official form of application shall include a similar certificate signed by the Principal of the School in which the candidate has completed the course for said examination.

Papers

6.—(1) One question paper shall be set in each subject, except in the case of English, Agriculture and Horticulture, Household Science, and each of the following languages: Latin, Greek, French, German, Italian, Spanish. In each of these subjects there shall be two papers.

(2) Optional questions shall be given at all the examinations in History, and may be given in any other paper.

(3) In addition to the examinations on passages from the prescribed authors, questions on sight passages shall also be set at all the examinations in Greek, Latin, French, German, Italian, Spanish, and may also be set at the examination in English Literature.

(4) For each of the above examinations which includes English Literature as a subject, candidates will be expected to have memorized the prescribed passages in the English Literature texts, and their knowledge thereof will be tested in the English Literature paper.

Valuation of Papers

7.—(1) Every paper shall be valued at 100 marks.

(2) At the Middle and Upper School examinations in English Literature and English Composition one mark shall be deducted for each error in spelling, but not more than ten marks shall be deducted for such errors on any one paper.

(3) If, after the answer papers have been read, any question paper should be found to be longer, easier, or more difficult than required, due allowance may be made therefor.

Examination Report

8.—(1) Before the Middle and Upper School examinations begin a report on a form prescribed by the Minister shall be submitted from each School, signed by all the teachers concerned, as to the standing of their candidates. This report, if found satisfactory when tested, will be taken into account in settling the results.

(2) The names of all the candidates from the school shall be included in this report.

Appeals

9.—(1) The answer papers of all candidates at the Middle and Upper School examinations, who, on the valuation of the Associate Examiners, are found to have failed in any paper by not more than a small margin, shall be re-read before the settlement of the results.

(2) Subject to instructions from the Minister, candidates who fail at the Middle or Upper School examinations may have their papers re-read on lodging an appeal and paying a fee of \$2.00 per paper. The fee for a Lower School appeal is \$2.00 per paper.

(3) Candidates making appeals shall state where they wrote and the name of the examination attempted. *Principals sending in appeals in behalf of pupils shall make each appeal on a separate sheet of paper.*

(4) Should illness, bereavement, or any other unavoidable cause interfere with a candidate's examination, such circumstances shall be duly taken into account in settling the results, but only when fully reported to the Department with satisfactory documentary evidence, not later than the close of such examination.

SPECIAL PROVISIONS

LOWER SCHOOL EXAMINATIONS

10.—(1) Lower School standing for entrance into the Normal Schools will be granted to pupils in attendance at any Collegiate Institute, High School, or Continuation School, under the following conditions:

- (a) The provisions made in a school for teaching the courses shall be satisfactory to the High or Continuation School Inspector, as the case may be, and shall be maintained throughout the year.
- (b) The pupils to be granted credit in any subject shall have completed the prescribed course of study in that subject and shall have passed comprehensive tests conducted by the teacher of the subject with a standing of at least fifty per cent. of the aggregate marks assigned to the subject in all the tests of the school year.
- (c) One of the tests provided for in (b) shall be held towards the close of the school year and shall cover the prescribed course of study.
- (d) The Principal of the school and the teachers of the subjects concerned shall jointly certify that the conditions upon which the pupils are granted standing have been fulfilled.

(2) (a) The Lower School examinations will be conducted through High School Entrance Boards for pupils who are not in attendance at Collegiate Institutes, High Schools or Continuation Schools, and for those who may prepare themselves by private study. Pupils who fail to pass the tests set by the teachers in Collegiate Institutes, High Schools and Continuation Schools shall have the option of writing on the Lower School examination, but pupils who have passed these tests shall not be eligible for the examination.

(b) The examination will be held at each Collegiate Institute and High School and at such other High School Entrance centres as the County Council or the High School Board concerned may direct.

(c) On the request of the Public School Inspector in whose inspectorate the candidates will write, the Principal of each school having Lower School candidates shall furnish a confidential report showing the probable number of candidates from his school for each subject and of the centre or centres at which they intend to write.

(3) Not later than the last day of school, but prior to the commencement of the examinations, Principals shall forward to the Public School Inspector a statement showing the candidates to be granted certificates upon the recommendation of their teachers.

SPECIAL PROVISIONS

MIDDLE SCHOOL EXAMINATIONS

(4) Middle School standing will be granted to pupils in attendance at the day classes of any Collegiate Institute, High, Continuation, or Vocational School, under the following conditions:

- (a) The qualifications of the teachers concerned and the provisions made for teaching the Middle School courses shall be satisfactory to the Minister of Education.
- (b) A pupil, to be granted standing in a paper, shall have completed the prescribed course therefor and in the judgment of the principal and the teacher shall have obtained a standing on his year's work of at least 66 per cent.
- (c) The Principal of the school and the teachers of the subjects concerned shall certify that the foregoing conditions have been fulfilled.

General Provisions and Directions

(5) In conformity with the above special provisions Principals and teachers as well as candidates will take note of the following general provisions and directions:

- (a) At the end of April each candidate for Middle School standing shall fill out and submit his application as heretofore.
- (b) The methods and procedure of preparing reports on the standing of candidates, as provided under section 8, page 81, of the High School Courses, are left to the discretion of the principal and staff of each school.
- (c) The Principal and staff of each school, on the Friday preceding the Departmental examinations, shall submit, on a form to be supplied by the Department, a report for the year on *all pupils* who are candidates for Middle School standing. In schools where there are two or more forms or classes or groups doing Middle School work in a subject, each form or class or group shall be reported separately.
- (d) On the Thursday of the week immediately preceding the Departmental examinations, the Principal shall notify each candidate of the paper or papers on which he has been given the standing of at least 66 per cent.
- (e) There shall be no appeal to the Minister against the decision of the Principal and staff in the case of any candidate who has not been given at least 66 per cent. on a paper.
- (f) The Middle School examination will be conducted as heretofore, and all candidates other than those who have been granted standing on the reports of their teachers shall take the Departmental tests in the papers concerned.
- (g) All Middle School certificates will indicate Credit and Proficiency standing as heretofore.
- (h) (i) In schools in which there are prizes for Middle School candidates the awards may be made by the Principals and their staffs.

- (ii) Where scholarships or prizes are offered for competition among two or more schools the competitors shall take the Departmental examinations. The universities and other bodies under which such scholarships and prizes are awarded shall submit the names of the candidates with other necessary information to the Department of Education.

EXAMINATION REQUIREMENTS

Standards

11.—(1) Candidates may write on one or more papers at a time and in any order. On obtaining 50 per cent. of the marks assigned to any paper they will be given credit for having passed in such paper and will receive a certificate of such standing.

- (a) At the Middle School examination certificates will be issued showing the standing obtained on each paper, as follows: First grade proficiency, 75 per cent.; Second grade proficiency, 66 per cent.; Third grade proficiency, 60 per cent.; and Credit, 50 per cent.
- (b) At the Upper School examination the certificates will show standing as in the case of the Middle School examination. The certificates will also show honour standing by departments according to the standards set for Honour Matriculation; First Class, 75 per cent.; Second Class, 66 per cent.; and Third Class, 60 per cent.

Note.—Proficiency standing will not be indicated on Lower School certificates.

- (c) (i) Forty per cent. on a paper in any one of the following Upper School subjects will be accepted in lieu of credit for the corresponding Middle School paper: English (Literature and Composition), Algebra, Geometry, Chemistry, and the languages.
- (ii) Forty per cent. in the Upper School paper in Botany or Zoology will be accepted in lieu of credit for the corresponding Lower School paper.
- (iii) Forty per cent. or Credit standing on the Upper School paper in Modern History will be accepted in lieu of Credit for Middle School Canadian History, provided a candidate has a certificate for Lower School standing in Canadian History.

(2) These certificates of credit will be accepted pro tanto for admission to the Normal Schools and to the Universities and Colleges. Special certificates for this purpose are unnecessary.

12. Candidates for entrance into the Model Schools or into the Normal School courses leading to First or Second Class certificates, or for Matriculation into a University, are entitled to credit for each paper on which they obtained at least 50 per cent. at any former Departmental Lower School, Model Entrance, Middle School, or Upper School examination.

13. Candidates who have credit for one or more papers of the former Upper School Honour Matriculation examination may complete their standing by passing in the additional papers which they require under the present Regulations. Under this provision, credit for History (Second Course) is accepted as credit for Modern World History. Credit for History (First Course) is not so accepted.

14. Candidates who in any year prior to 1920 wrote on the examinations conducted by the University Matriculation Board, and who wish to qualify for entrance into the Normal School courses leading to First or Second Class certificates, are entitled to credit for each paper on which they obtained at least 50 per cent.

REQUIREMENTS FOR ADMISSION TO THE NORMAL SCHOOLS

15. (1) The course for Interim Second Class certificates will be provided at the Normal Schools for the school years commencing in 1933 and in 1934 but not thereafter.

(2) Applicants for admission to the course for Interim First Class certificates at the Normal Schools who, not later than September, 1933, obtained Departmental certificates in one or more of—

- (a) Lower School Botany, Zoology, Agriculture (First Year), Agriculture (Second Year);
- (b) Middle School Physics (or Agriculture, Part I), Chemistry (or Agriculture, Part II);
- (c) Upper School English (Literature and Composition), History; and any two of Algebra, Geometry, Trigonometry; and any two of Latin, Greek, French, German (or Spanish), Biological Science (Botany and Zoology), Physical Science (Physics and Chemistry),

may complete their standing for admission to the said course under the former regulations as set forth in the Courses of Study and Examinations of the High Schools, Collegiate Institutes and Continuation Schools, revised, 1932.

16. Beginning with the session of 1935, all applicants for admission to the Normal Schools, other than those specified in Section 2 above, shall submit Departmental certificates in the following subjects:

(1) Lower School—

Arithmetic, Art, British History, Geography, Grammar, Physiography, and two of Botany, Zoology, Agriculture (First Year), Agriculture (Second Year).

Note 1—Upper School certificates in Botany and Zoology will be accepted in lieu of Lower School certificates in any two of Botany, Zoology, Agriculture (First Year), Agriculture (Second Year).

Note 2—A Middle School certificate in Art will be accepted in lieu of a Lower School certificate in Art.

Note 3—Middle or Upper School certificates in Latin will no longer be accepted in lieu of a Lower School certificate in English Grammar.

(2) Middle School—

English (Literature and Composition), Algebra, Geometry, Canadian History, Ancient History (or Music), Physics (or Agriculture, Part I), Chemistry (or Agriculture, Part II).

Note 1—A Certificate of having obtained 40% on a paper in any one of the following Upper School subjects will be accepted in lieu of credit for the corresponding Middle School paper:

English (Literature and Composition),
Algebra, Geometry, Chemistry.

Note 2—The Junior certificate issued by the Toronto Conservatory of Music in any practical subject other than Sight-singing, together with the required Theory, will be accepted in lieu of the Middle School certificate in Music.

(3) Upper School—

English (Literature and Composition), History;
any two of Algebra, Geometry, Trigonometry; and
any two of Latin, Greek, French, German (or Spanish), Biological Science (Botany and Zoology), Physical Science (Physics and Chemistry).

Note.—The third mathematical subject or the Intermediate certificate issued by the Toronto Conservatory of Music in any practical subject other than Sight-singing, together with the required Theory, will be accepted in lieu of either Physics or Chemistry.

Requirements for Matriculation

17.—(1) The subjects of the Middle School required for Pass Matriculation are the following: English (Literature and Composition), Canadian History, Ancient History (or Music), Algebra, Geometry, Latin;

Two of: Greek, French, German, Spanish *or* Italian, Science (Physics, or Agriculture, Part I; Chemistry, or Agriculture, Part II).

Note.—A certificate of having passed the examination of the Toronto Conservatory of Music in Junior History and Junior Harmony will be accepted in lieu of the Middle School examination in Music (or Ancient History).

(2) Candidates who prior to 1929 passed the examination in either Part I or Part II of the Middle School Agriculture and Horticulture course may complete the science requirements of the Middle School by passing the examination in one of the following courses as outlined in the High School Courses of Study, 1928:

- (a) Agriculture and Horticulture, Part I.
- (b) Agriculture and Horticulture, Part II.
- (c) Physics.
- (d) Chemistry.

(3) There is no special examination known as Honor Matriculation or Senior Matriculation; but Proficiency standing may be granted on all Pass papers, and Honour standing may be granted in English (Literature, Composition), History, Mathematics (Algebra, Geometry and Trigonometry), Latin, Greek, French, German, Spanish, Italian, Biology (Botany and Zoology), Physics, Chemistry.

(4) Honours are not granted on papers, but on the combination of papers set in a subject, e.g., English, Mathematics, Latin, etc.

(5) The standing for honours is a minimum of 50 per cent. on each paper, with an average of 60 per cent. in the papers of each subject.

Note.—The requirements for admission to University Honour courses are to be found in the Matriculation Calendars of the Universities.

GRADUATION DIPLOMAS

18.—(1) On application of the Principal, a Graduation Diploma will be granted to every pupil whose conduct has been satisfactory and who fulfils the following conditions:

- (a) The pupil shall complete satisfactorily at least twelve subjects selected by the Principal and approved by the Minister as suitable to the pupil and to the organization of his school.
- (b) The twelve subjects shall include:
 - (i) Lower School British History,
 - (ii) Lower School Physiography,
 - (iii) Middle *or* Upper School English.
 - (iv) Middle School Canadian History,
 - (v) At least five of the other optional subjects of the Middle *or* Upper School as stated in Sections 2 and 3 of pages 8 and 9 of the High School Courses of Study.

(2) A subject (e.g., Algebra, Physics, Latin, etc.) cannot be accepted from more than one of the Lower, Middle or Upper School courses.

(3) Where a language is selected the pupil shall complete the courses in both Authors and Composition in the Middle School *or* in the Upper School.

(4) A pupil who has been awarded a Graduation Diploma, and who later completes satisfactorily the courses in additional subjects may, on application to the Principal, have such additional subjects recorded on his Graduation Diploma.

